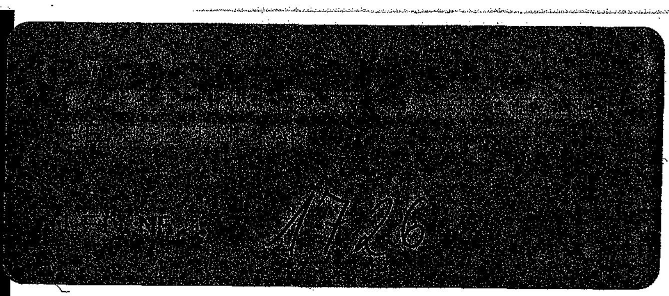
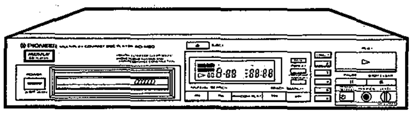
Service Manual





SERVICE GUIDE
ORDER NO.
ARP1369

MULTI-PLAY COMPACT DISC PLAYER

PD-M50
PD-M40
PD-M40-S

- For the service manual of the models which has been described in service guide, refer to the service manual (ARP1342) of PD-M50/KU, KC, HEM, HB, SD, SD/G, PD-M40/KU, KC, HEM, HP, SD and PD-M40-S/HEM.

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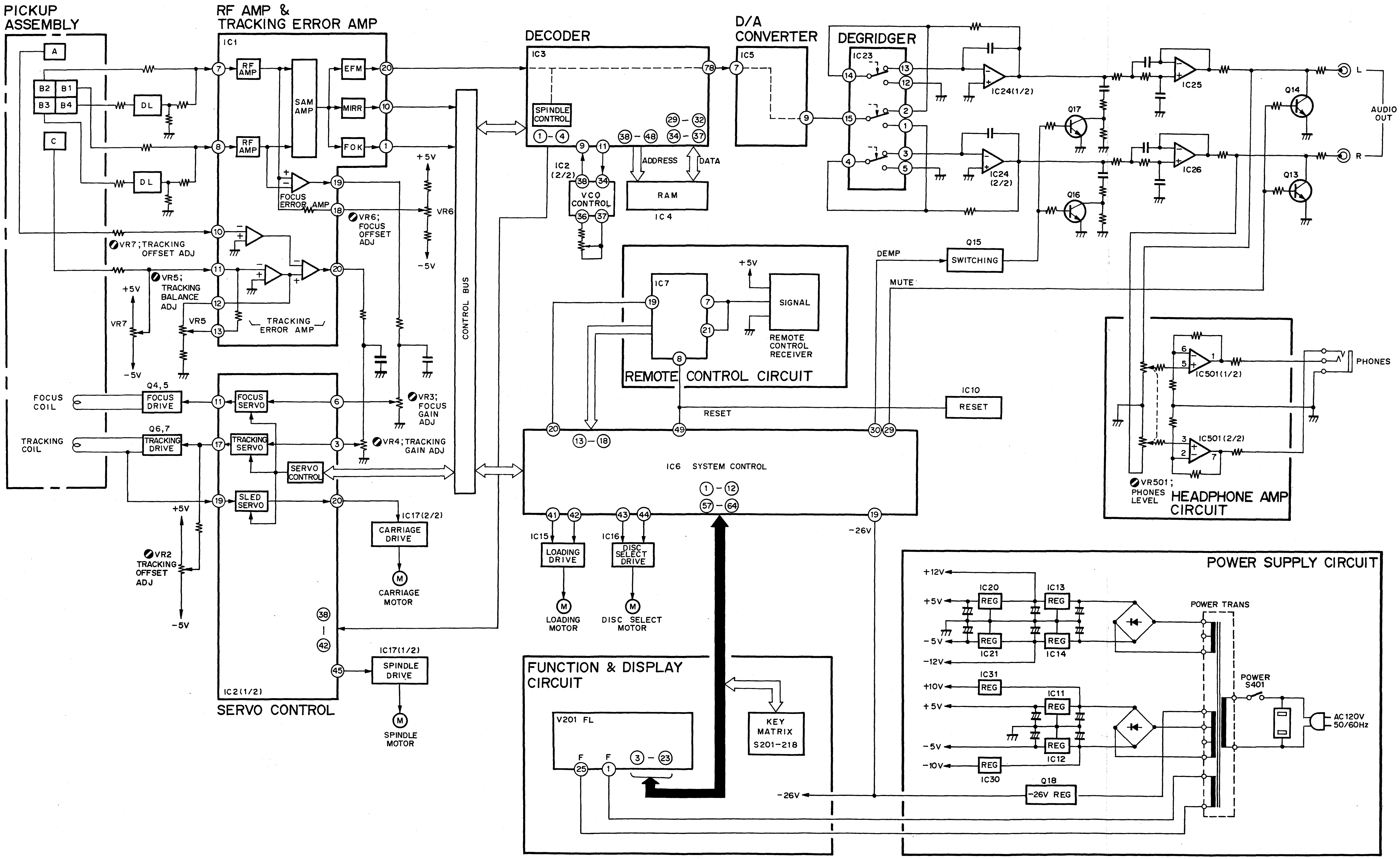
1. IC DESCRIPTIONS

Pin Description (PD3095)

Pin No.	Port	Name	I/O	Function	Initial level
1	D11	DIG4	O	Key display matrix digit output	L
2	D12	DIG5	O	Key display matrix digit output	L
3	D13	DIG6	O	Key display matrix digit output	L
4	D14	DIG7	O	Key display matrix digit output	L
5	D15	SEGh	O	Segment indication data output (h) OFF ON	L
6	R_{00}	SEGa	O	Segment indication data output (a) OFF ON	L
7	R_{01}	SEGb	O	Segment indication data output (b) OFF ON	L
8	R_{02}	SEGc	O	Segment indication data output (c) OFF ON	L
9	R_{03}	SEGd	O	Segment indication data output (d) OFF ON	L
10	R_{10}	SEGe	O	Segment indication data output (e) OFF ON	L
11	R_{11}	SEGf	O	Segment indication data output (f) OFF ON	L
12	R_{12}	SEGg	O	Segment indication data output (g) OFF ON	L
13	R_{13}	RK4	I	Remote control key code input	—
14	R_{20}	RK5	I	Remote control key code input (MSB)	—
15	R_{21}	RK3	I	Remote control key code input	—
16	R_{22}	RK2	I	Remote control key code input	—
17	R_{23}	RK1	I	Remote control key code input	—
18	R_{A0}	RK0	I	Remote control key code input (LSB)	—
19	Vdisp	—	—	−26V	—
20	R_{30}	$\overline{RKS}$	I	Remote control key strobe input KEY-ON	—
21	R_{31}	$\overline{XLT}$	O	LSI control data executing pulse output EXECUTE	H
22	$\overline{INT0}$	SCOR	I	Sub-code sync input SYNC	—
23	R_{33}	SENS	I	LSI operating mode multi-mode input	—
24	R_{50}	CRCF	I	Sub-code Q-CRC checking result input NG OK	—
25	R_{51}	GFS	I	Frame sync lock input UNLOCK LOCK	—
26	R_{52}	ATTE	I	ATT function on/off selection input ON OFF	—
27	R_{53}	FOK	I	In-focus input NG OK	—
28	R_{60}	$\overline{LDON}$	O	Laser diode on/off output ON OFF	H
29	R_{61}	MUTE	O	Muting on/off output OFF ON	H
30	R_{62}	$\overline{DEMP}$	O	De-emphasis on/off output ON OFF	H
31	R_{63}	CLVH	O	Spindle CLV-H output CLV-H	L
32	Vcc	—	—	+5V	—
33	$\overline{SCK}$	CLK	O	Serial transfer clock	H
34	SI	SUBQ	I	Sub-code Q data input 0 1 2 3 4 5 6 7	—
35	SO	DATA	O	LSI control data serial output	H
36	R_{43}	$\overline{TEST}$	I	Test mode selection input TEST NORMAL	—
37	R_{70}	$\overline{ALAT}$	O	ATT level data latch pulse output LATCH	H
38	R_{71}	ADAT	O	ATT level data serial output	H
39	R_{72}	ACLK	O	ATT level data serial transfer clock	H
40	R_{73}	Unused	O	(Open)	L
41	R_{80}	LIN	O	Disc loading OUT BRAKE	H
42	R_{81}	LOUT	O	in/out output IN	H
43	R_{82}	DSUP	O	Disc selector DOWN BRAKE	H
44	R_{83}	DSDW	O	up/down output UP	H

2. BLOCK DIAGRAM


PICKUP ASSEMBLY
A
B1
B2
B3
B4
C
DL
FOCUS COIL
TRACKING COIL
Q4,5
FOCUS DRIVE
Q6,7
TRACKING DRIVE
RF AMP & TRACKING ERROR AMP
IC1
RF AMP
SAM AMP
EFM
MIRR
FOK
FOCUS ERROR AMP
TRACKING ERROR AMP
VR7; TRACKING OFFSET ADJ
VR5; TRACKING BALANCE ADJ
VR6; FOCUS OFFSET ADJ
VR6
VR7
VR5
+5V
-5V
VR3; FOCUS GAIN ADJ
VR4; TRACKING GAIN ADJ
VR2 TRACKING OFFSET ADJ
FOCUS SERVO
TRACKING SERVO
SERVO CONTROL
SLED SERVO
IC2(1/2)
SERVO CONTROL
IC17(2/2)
CARRIAGE DRIVE
CARRIAGE MOTOR
IC17(1/2)
SPINDLE DRIVE
SPINDLE MOTOR
CONTROL BUS
DECODER
IC3
SPINDLE CONTROL
IC2 (2/2)
VCO CONTROL
ADDRESS
DATA
RAM
IC4
D/A CONVERTER
IC5
DEGRIDGER
IC23
IC24(1/2)
IC24 (2/2)
IC25
IC26
Q17
Q16
Q14
Q13
L
R
AUDIO OUT
DEMP
MUTE
Q15
SWITCHING
REMOTE CONTROL CIRCUIT
IC7
SIGNAL
REMOTE CONTROL RECEIVER
IC10
RESET
IC6 SYSTEM CONTROL
-26V
IC15
LOADING DRIVE
LOADING MOTOR
IC16
DISC SELECT DRIVE
DISC SELECT MOTOR
HEADPHONE AMP CIRCUIT
IC501(1/2)
IC501(2/2)
VR501; PHONES LEVEL
PHONES
FUNCTION & DISPLAY CIRCUIT
V201 FL
KEY MATRIX S201-218
POWER SUPPLY CIRCUIT
+12V
+5V
-5V
-12V
+10V
-10V
IC20
IC13
IC21
IC14
REG
IC31
IC11
IC12
IC30
Q18
-26V REG
POWER TRANS
POWER S401
AC120V 50/60Hz

3. CIRCUIT DESCRIPTIONS

3.1 ACCURATE FOCUS SERVO SYSTEM

As a method (the Accurate Focus System) for reducing the distortion of RF signals read by the pickup, delays have been applied to the output of 2 photodiodes that precede the quarter photodiodes and is followed by an addition operation in order to achieve improvements in frequency response, distortion, S/N and so on as well as to increase the accuracy of signal reading.

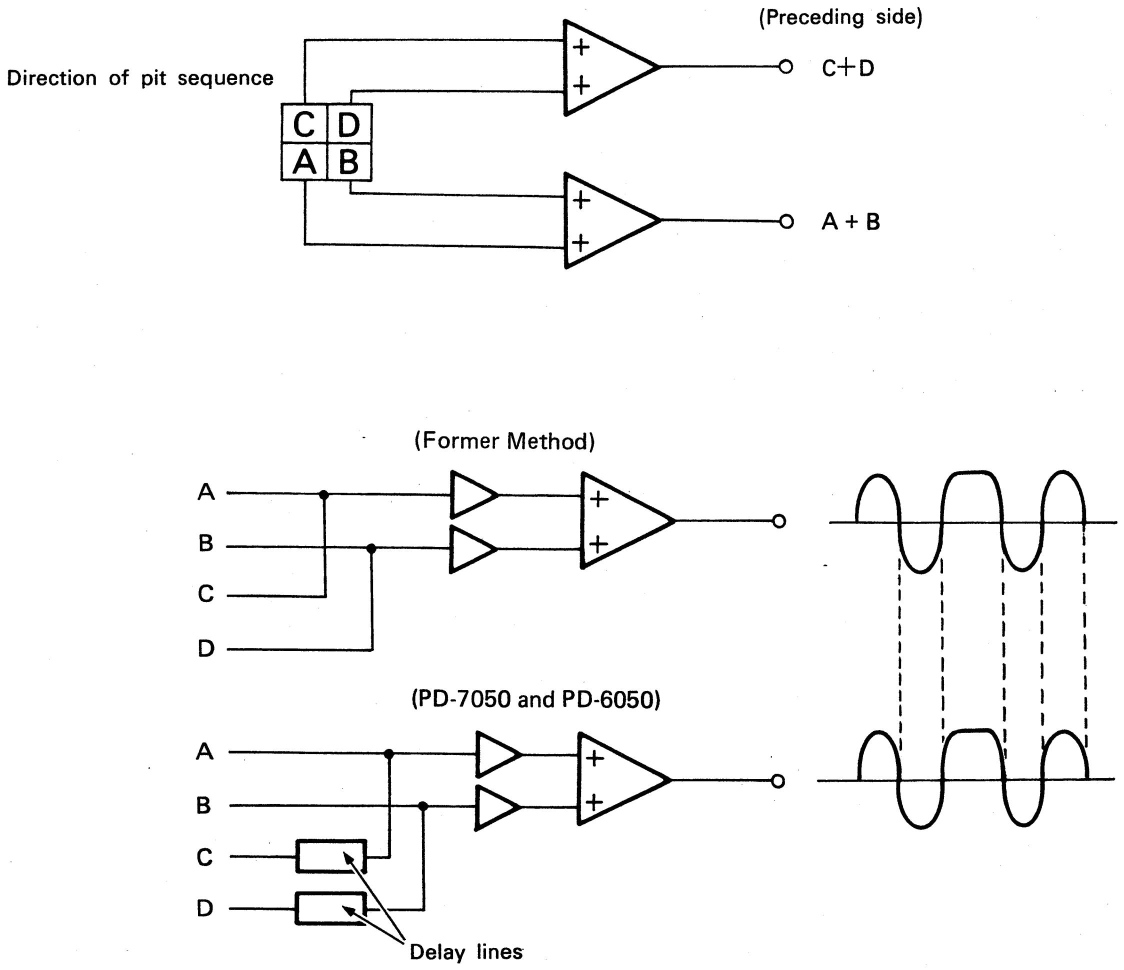

(Preceding side)
Direction of pit sequence
C
D
A
B
C+D
A + B
(Former Method)
A
B
C
D
(PD-7050 and PD-6050)
A
B
C
D
Delay lines

Fig. 3-1

3.2 IC DESCRIPTION

3.2.1 CXA1082AS

FOCUS SERVO SYSTEM

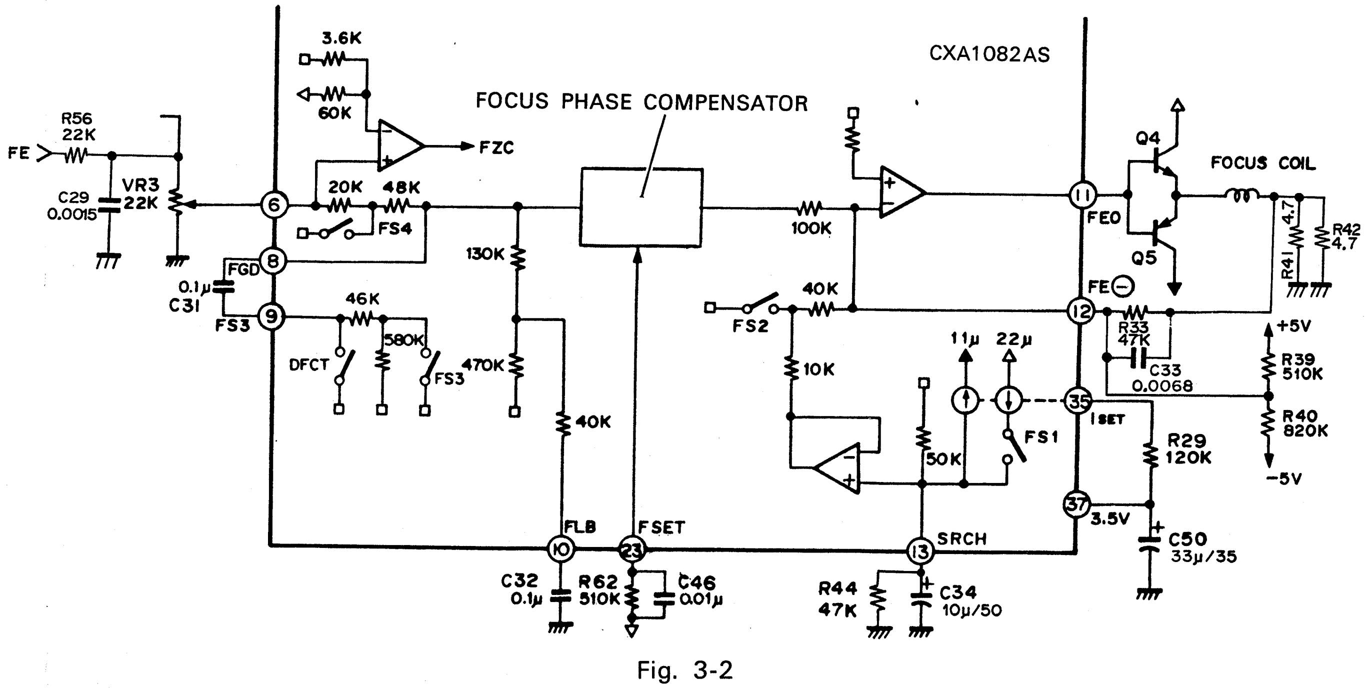

CXA1082AS
FOCUS PHASE COMPENSATOR
FE
R56
22K
C29
0.0015
VR3
22K
3.6K
60K
FZC
20K
48K
FS4
6
8
9
FGD
0.1μ
C31
FS3
130K
46K
580K
DFCT
470K
FS3
40K
100K
FS2
40K
10K
50K
11μ
22μ
FS1
FLB
10
FSET
23
SRCH
13
C32
0.1μ
R62
510K
C46
0.01μ
R44
47K
C34
10μ/50
11
FEO
12
FE⊖
Q4
Q5
FOCUS COIL
R41
4.7
R42
4.7
R33
47K
C33
0.0068
35
ISET
+5V
R39
510K
R40
820K
-5V
R29
120K
37
3.5V
C50
33μ/35

Fig. 3-2

The above figure is a block diagram of the Focus Servo System (Fig. 3-2).

When FS3 is ON, the high-cut filter gain that formed the low-range time constant can be dropped by the operation of the capacitor connected between Pins 8 and 9 as well as the internal resistor.

The capacitor between Pin 10 and GND is a time constant that boost the low-range frequency during normal play mode.

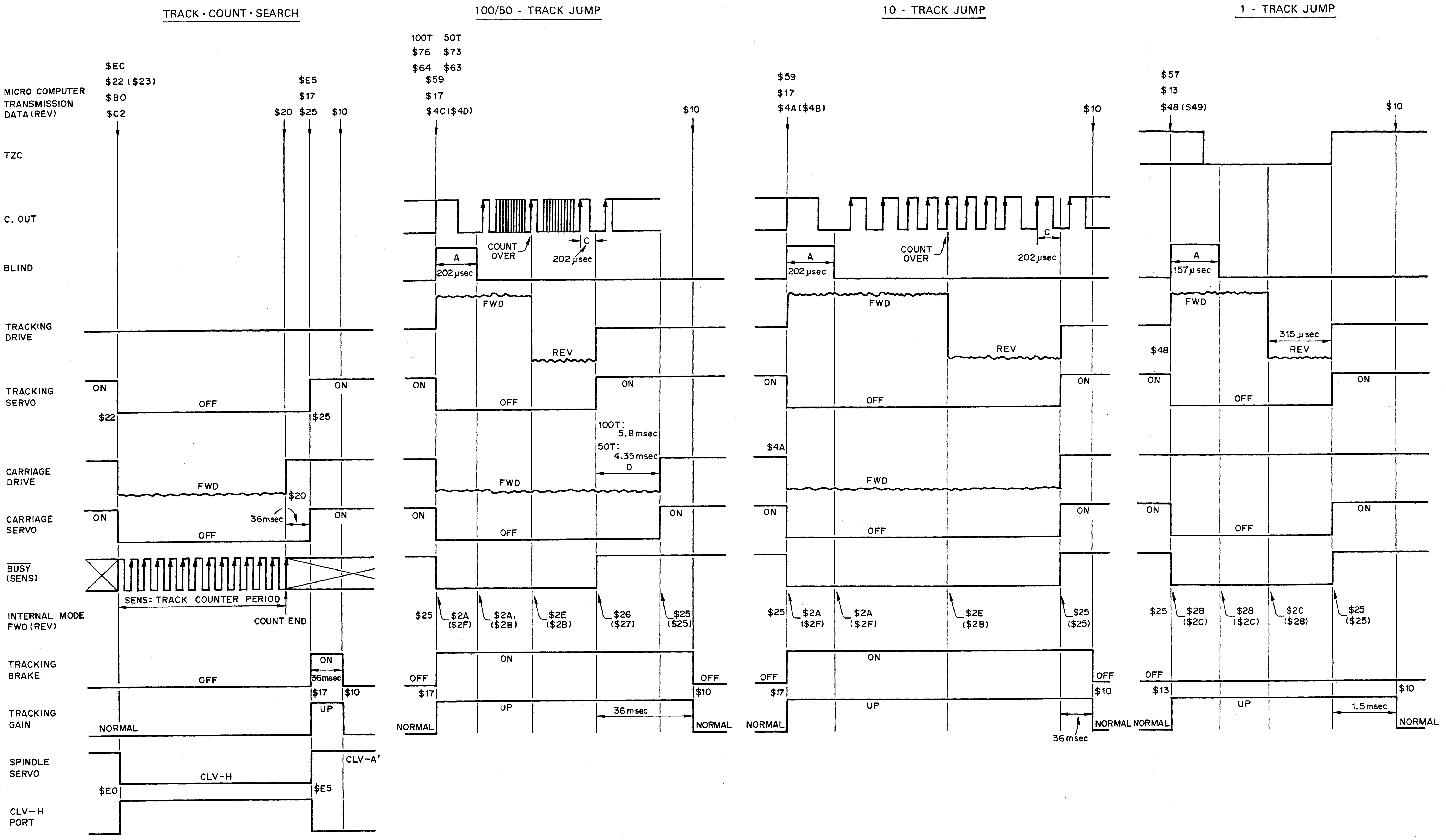
The peak frequency of the Focus Phase Compensator is in inverse proportion to the value of the resistor connected to Pin 23, and its peak value is approximately 1.2 kHz in case of 510 kΩ resistance value.

The height of the focus search operation is approximately ±1.1 Vp-p in case of the time constants shown in the Fig. 3-2. This height is in inverse proportion to the value of the resistor connected between Pins 35 and 36.

This system is set to a value that is 5.7% of difference between the reference voltage Vcc for the inverted input of the FZC comparator and VC (Pin 1); that is, it is set to (Vcc - VC) × 5.7%.

NOTE: When the value of the resistor connected to Pin 23 is changed, changes will also concurrently occur in the peak values of the phase-compensating peak value Focus Servo and Tracking and Carriage Servo systems as well as in the fc value of CVL LPF. In addition, the dynamic range and offset voltage of the OP Amp will also be concurrently changed.

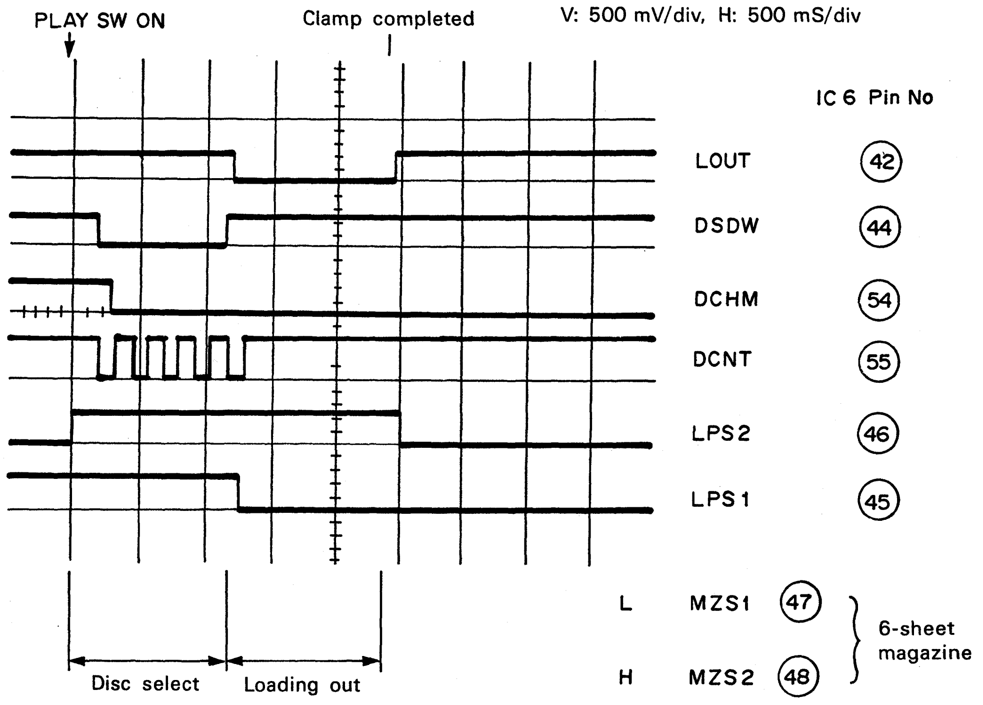
SEARCH Mode Access Operation Timing Chart


TRACK • COUNT • SEARCH
100/50 - TRACK JUMP
10 - TRACK JUMP
1 - TRACK JUMP
MICRO COMPUTER TRANSMISSION DATA (REV)
TZC
C. OUT
BLIND
TRACKING DRIVE
TRACKING SERVO
CARRIAGE DRIVE
CARRIAGE SERVO
BUSY (SENS)
INTERNAL MODE FWD (REV)
TRACKING BRAKE
TRACKING GAIN
SPINDLE SERVO
CLV-H PORT
$EC
$22 ($23)
$B0
$C2
$E5
$17
$20 $25 $10
100T 50T
$76 $73
$64 $63
$59
$17
$4C ($4D)
$10
$59
$17
$4A ($4B)
$10
$57
$13
$48 (S49)
$10
COUNT OVER
A
C
202 μsec
157 μsec
FWD
REV
315 μsec
$48
ON
OFF
$22
$25
$4A
100T: 5.8msec
50T: 4.35msec
D
$20
36msec
SENS= TRACK COUNTER PERIOD
COUNT END
$25
$2A ($2F)
$2A ($2B)
$2E ($2B)
$26 ($27)
$25 ($25)
$2A ($2F)
$2E ($2B)
$28 ($2C)
$2C ($28)
$17
$10
$13
UP
NORMAL
36msec
1.5msec
CLV-H
CLV-A'
$E0
$E5

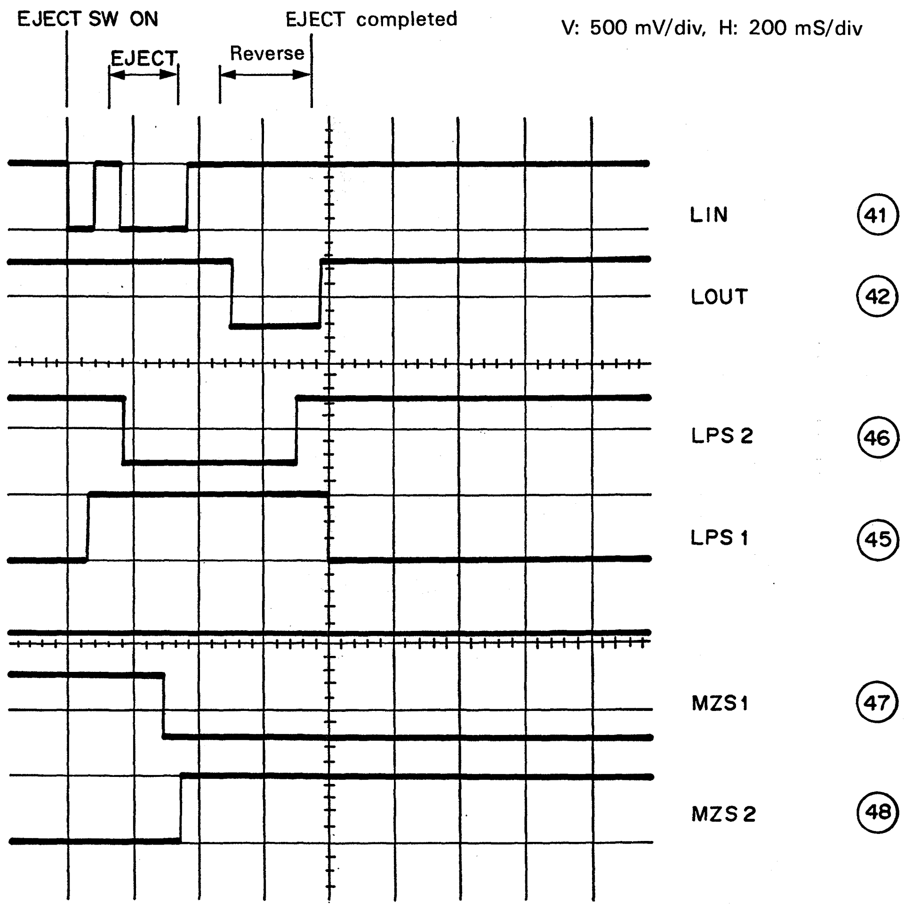
- Jamp-timing are all for FWD jumps. In case of REV jumpm directions of 〰 periods in TRACKING/CARRIAGE and polarity of SENS (TRACK, COUNT, SERACH) input are reversed.
- Refer to FLOW CHART and PROGRAM DESCRIPTION.
- H/L in this timing chart are only for convenience sake, not the actual port's output etc

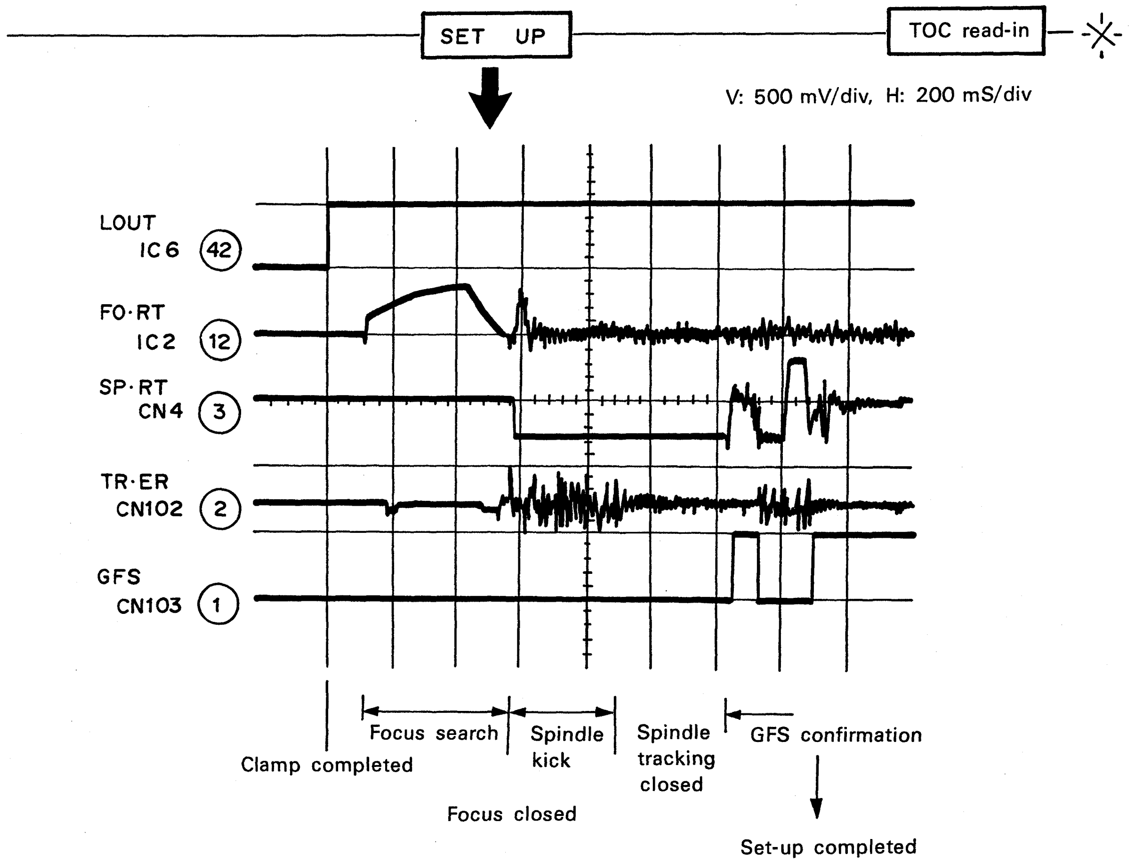
Loading
disc select

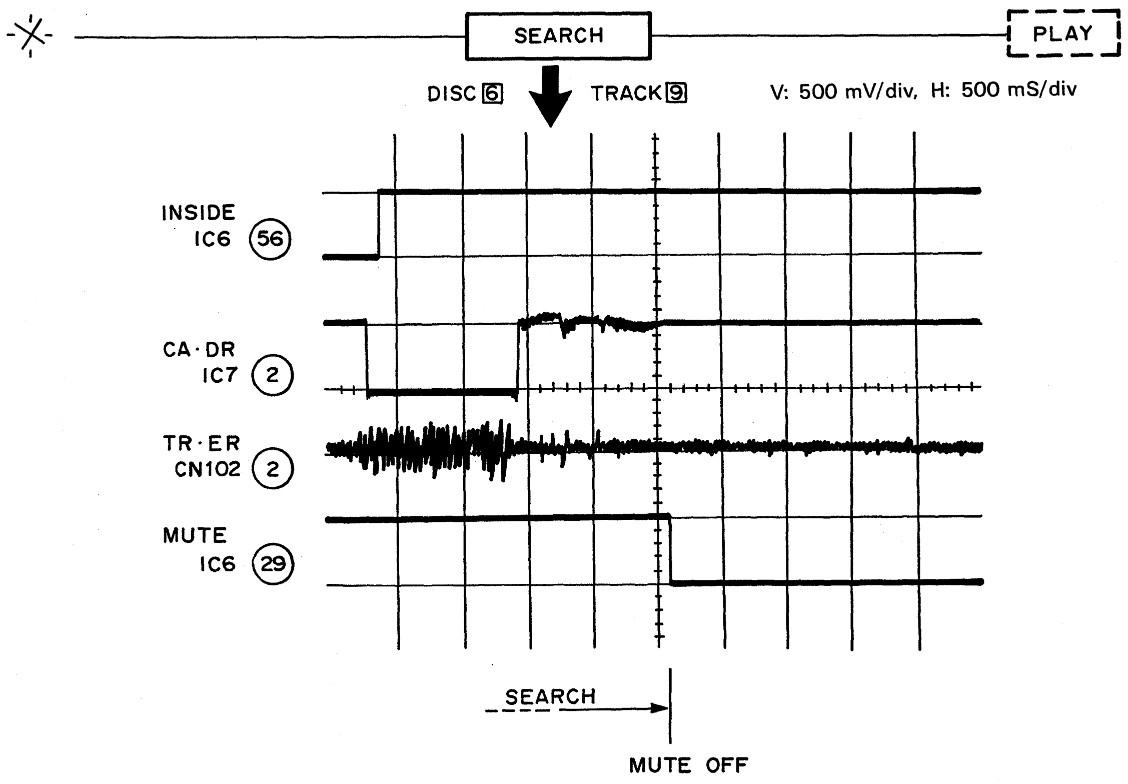
DISC 6 Play



EJECT

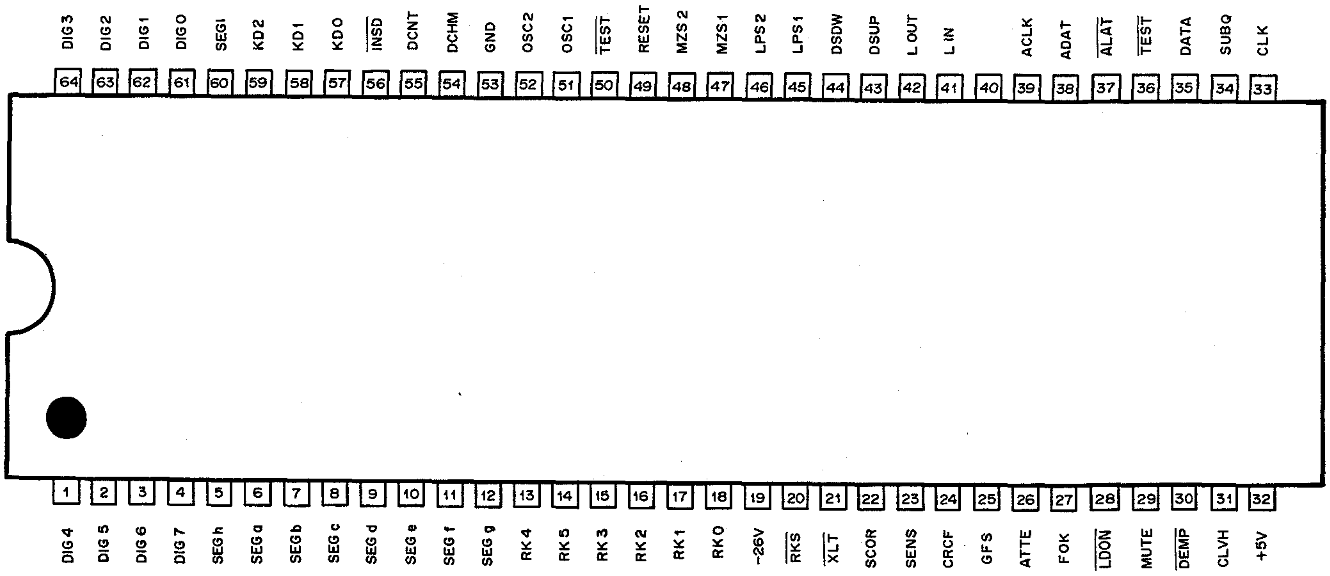




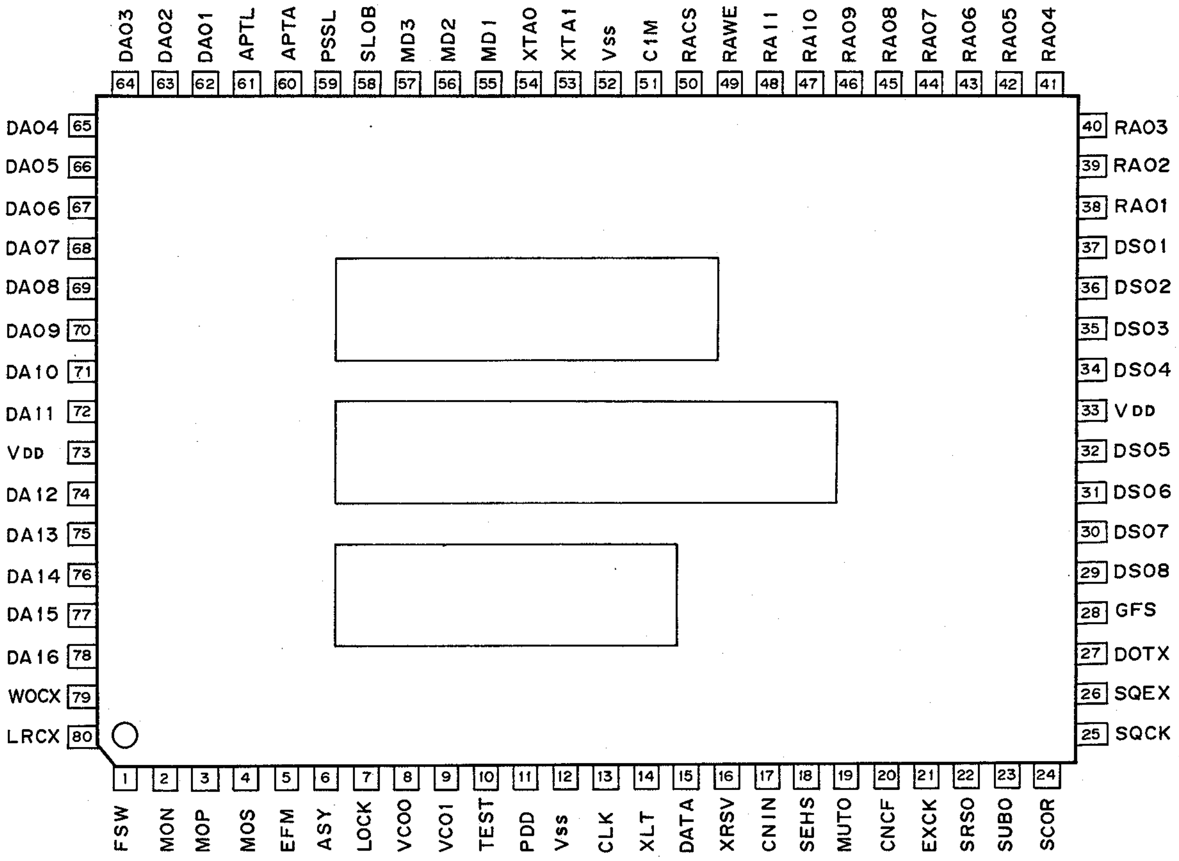


Pin No.	Port	Name	I/O	Function	Initial level
45	R_{90}	LPS1	I	Loading position LOAD EJECT	—
46	R_{91}	LPS2	I	SW input CLAMP HOME	—
47	R_{92}	MZS1	I	Magazine discrimination 6 sheets 1 sheet	—
48	R_{93}	MZS2	I	SW input MAGAZINE IN EJECT	—
49	RESET	—	I	CPU reset input RESET RUN	—
50	$\overline{\text{TEST}}$	—	I	+5V (TP for factory use)	—
51	OSC1	—	I	External clock (4.2336MHz)	—
52	OSC2	—	O	(OPEN)	—
53	GND	—	—	GND	—
54	D0	DCHM	I	Disc selector home SW input NOT HOME	—
55	D1	DCNT	I	Disc count pulse input 1 6	—
56	D2	$\overline{\text{INSD}}$	I	Slider inside SW input INSIDE NOT	—
57	D3	KD0	I	Key matrix input KEY-ON	—
58	D4	KD1	I	Key matrix input KEY-ON	—
59	D5	KD2	I	Key matrix input KEY-ON	—
60	D6	SEGI	O	Segment indication data output (I) OFF ON	L
61	D7	DIG0	O	Key display matrix digit output	L
62	D8	DIG1	O	Key display matrix digit output	L
63	D9	DIG2	O	Key display matrix digit output	L
64	D10	DIG3	O	Key display matrix digit output	L

PD3095


DIG3 64
DIG2 63
DIG1 62
DIG0 61
SEGI 60
KD2 59
KD1 58
KD0 57
INSD 56
DCNT 55
DCHM 54
GND 53
OSC2 52
OSC1 51
TEST 50
RESET 49
MZS2 48
MZS1 47
LPS2 46
LPS1 45
DSDW 44
DSUP 43
L OUT 42
L IN 41
40
ACLK 39
ADAT 38
ALAT 37
TEST 36
DATA 35
SUBQ 34
CLK 33
1 DIG4
2 DIG5
3 DIG6
4 DIG7
5 SEGh
6 SEGa
7 SEGb
8 SEGc
9 SEGd
10 SEGe
11 SEGf
12 SEGg
13 RK4
14 RK5
15 RK3
16 RK2
17 RK1
18 RK0
19 −26V
20 RKS
21 XLT
22 SCOR
23 SENS
24 CRCF
25 GFS
26 ATTE
27 FOK
28 LDON
29 MUTE
30 DEMP
31 CLVH
32 +5V

CXD1135Q


1 FSW
2 MON
3 MOP
4 MOS
5 EFM
6 ASY
7 LOCK
8 VCOO
9 VCO1
10 TEST
11 PDD
12 Vss
13 CLK
14 XLT
15 DATA
16 XRSV
17 CNIN
18 SEHS
19 MUTO
20 CNCF
21 EXCK
22 SRSO
23 SUBO
24 SCOR
25 SQCK
26 SQEX
27 DOTX
28 GFS
29 DSO8
30 DSO7
31 DSO6
32 DSO5
33 VDD
34 DSO4
35 DSO3
36 DSO2
37 DSO1
38 RAO1
39 RAO2
40 RAO3
41 RAO4
42 RAO5
43 RAO6
44 RAO7
45 RAO8
46 RAO9
47 RA10
48 RA11
49 RAWE
50 RACS
51 C1M
52 Vss
53 XTA1
54 XTAO
55 MD1
56 MD2
57 MD3
58 SLOB
59 PSSL
60 APTA
61 APTL
62 DAO1
63 DAO2
64 DAO3
65 DAO4
66 DAO5
67 DAO6
68 DAO7
69 DAO8
70 DAO9
71 DA10
72 DA11
73 VDD
74 DA12
75 DA13
76 DA14
77 DA15
78 DA16
79 WOCX
80 LRCX

Pin Description

Pin No.	Pin name	I/O	Function
1	FSW	O	Output filter time constant selection output of spindle motor
2	MON	O	ON/OFF control output of spindle motor
3	MDP	O	Drive output of spindle motor. Rough control during CLV-S mode and phase control during CLV-P mode.
4	MDS	O	Drive output of spindle motor. Speed control during CLV-S mode.
5	EFM	I	EFM signal input from the RF amplifier
6	ASY	O	Output to control slice level of EMF signal
7	LOCK	O	Perform sampling with WFCK/16 of GFS signal and if it is "H", outputs "H" consecutively 8 times. If it is "L", outputs "L".
8	VCOO	O	VCO output. When it is locked to EFM signal, f=8.6436MHz.
9	VCOI	I	VCO input
10	TEST	I	(0V)
11	PDO	O	Phase comparative output of EFM signal and VCO/2
12	VSS	—	GND (0V)
13	CLK	I	Serial data transfer clock input from CPU. Latches data at rising edge of clock.
14	XLT	I	Latches input from CPU. Latches data (serial data from CPU) of 8-bit shift register to each register.
15	DATA	I	Serial data input from the CPU
16	XRST	I	System reset input. Reset during "L".
17	CNIN	I	Tracking pulse input
18	SENSE	O	Outputs internal condition corresponding to address
19	MUTG	I	Muting input. When the ATTM of the internal register is "L", normal condition with MUTG at "L" and no sound condition at "H".
20	CRCF	O	Outputs CRC checking result of sub-code Q
21	EXCK	I	Clock input for the serial output of the sub-code
22	SBSO	O	Serial output of sub-code
23	SUBQ	I	Sub-code Q output
24	SCOR	O	Sub-code SYNC S0+S1 output
25	SQCK	I/O	Reading clock of sub-code Q
26	SQEX	I	Selection input of SQCK
27	DOTX	O	Digital audio interface output (When OFF, outputs $\overline{\mathrm{WFCK}}$.) (OPTION)
28	GFS	O	Displays output of locked condition of frame SYNC.
29	DB08	I/O	Data pin of external RAM. DATA8 (MSB).
30	DB07	I/O	Data pin of external RAM. DATA7.
31	DB06	I/O	Data pin of external RAM. DATA6.
32	DB05	I/O	Data pin of external RAM. DATA5.
33	VDD	—	Power supply (+5V)
34	DB04	I/O	Data pin of external RAM. DATA4.
35	DB03	I/O	Data pin of external RAM. DATA3.
36	DB02	I/O	Data pin of external RAM. DATA2.
37	DB01	I/O	Data pin of external RAM. DATA1 (LSB).
38	RA01	O	Address output of external RAM. ADDR01 (LSB).
39	RA02	O	Address output of external RAM. ADDR02
40	RA03	O	Address output of external RAM. ADDR03
41	RA04	O	Address output of external RAM. ADDR04
42	RA05	O	Address output of external RAM. ADDR05
43	RA06	O	Address output of external RAM. ADDR06
44	RA07	O	Address output of external RAM. ADDR07
45	RA08	O	Address output of external RAM. ADDR08

Pin No.	Pin name	I/O	Function
46	RA09	O	Address output of external RAM. ADDR09
47	RA10	O	Address output of external RAM. ADDR10
48	RA11	O	Address output of external RAM. ADDR11 (MSB)
49	RAWE	O	Write Enable signal output to the external RAM. (Active during "L".)
50	RACS	O	Chip Select signal output to the external RAM. (Active during "L".)
51	C4M	O	1/2-divided output of crystal. f=4.2336MHz.
52	VSS	—	GND (0V)
53	XTAL	I	Crystal oscillating circuit input. f=8.4672MHz or f=16.9344MHz.
54	XTAO	O	Crystal oscillating circuit output. f=8.4672MHz or f=16.9344MHz.
55	MD1	I	Mode selection input 1
56	MD2	I	Mode selection input 2
57	MD3	I	Mode selection input 3
58	SLOB	I	Code selection input of audio data output. 2's complement output during "L" and offset binary output during "H".
59	PSSL	I	Mode selection input of audio data output. Serial output during "L" and parallel output during "H".
60	APTR	O	Aperture compensation control output. 88.2kHz during filter ON and 44.1kHz during OFF.
61	APTL	O	Aperture compensation control output. 88.2kHz during filter ON and 44.1kHz during OFF.
62	DA01	O	DA01 (LSB of parallel audio data) output when PSSL="H". C1F1 output when PSSL="L".
63	DA02	O	DA02 output when PSSL="H". C1F2 output when PSSL="L".
64	DA03	O	DA03 output when PSSL="H". C2F1 output when PSSL="L".
65	DA04	O	DA04 output when PSSL="H". C2F2 output when PSSL="L".
66	DA05	O	DA05 output when PSSL="H". C2FL output when PSSL="L".
67	DA06	O	DA06 output when PSSL="H". C2PO output when PSSL="L".
68	DA07	O	DA07 output when PSSL="H". RFCK output when PSSL="L".
69	DA08	O	DA08 output when PSSL="H". WFCK output when PSSL="L".
70	DA09	O	DA09 output when PSSL="H". PLCK output when PSSL="L".
71	DA10	O	DA10 output when PSSL="H". UGFS output when PSSL="L".
72	DA11	O	DA11 output when PSSL="H". GTOP output when PSSL="L".
73	VDD	—	Power supply (+5V)
74	DA12	O	DA12 output when PSSL="H". RAOV output when PSSL="L".
75	DA13	O	DA13 output when PSSL="H". C4LR output when PSSL="L".
76	DA14	O	DA14 output when PSSL="H". C210 output when PSSL="L".
77	DA15	O	DA15 output when PSSL="H". C210 output when PSSL="L".
78	DA16	O	DA16 (MSB of parallel audio data) output when PSSL="H". Data output when PSSL="L".
79	WDCK	O	Strobe signal output. 176.4kHz during filter ON and 88.2kHz during OFF.
80	LRCK	O	Strobe signal output. 88.2kHz during filter ON and 44.1kHz during OFF.

TRACKING AND CARRIAGE SERVO SYSTEM

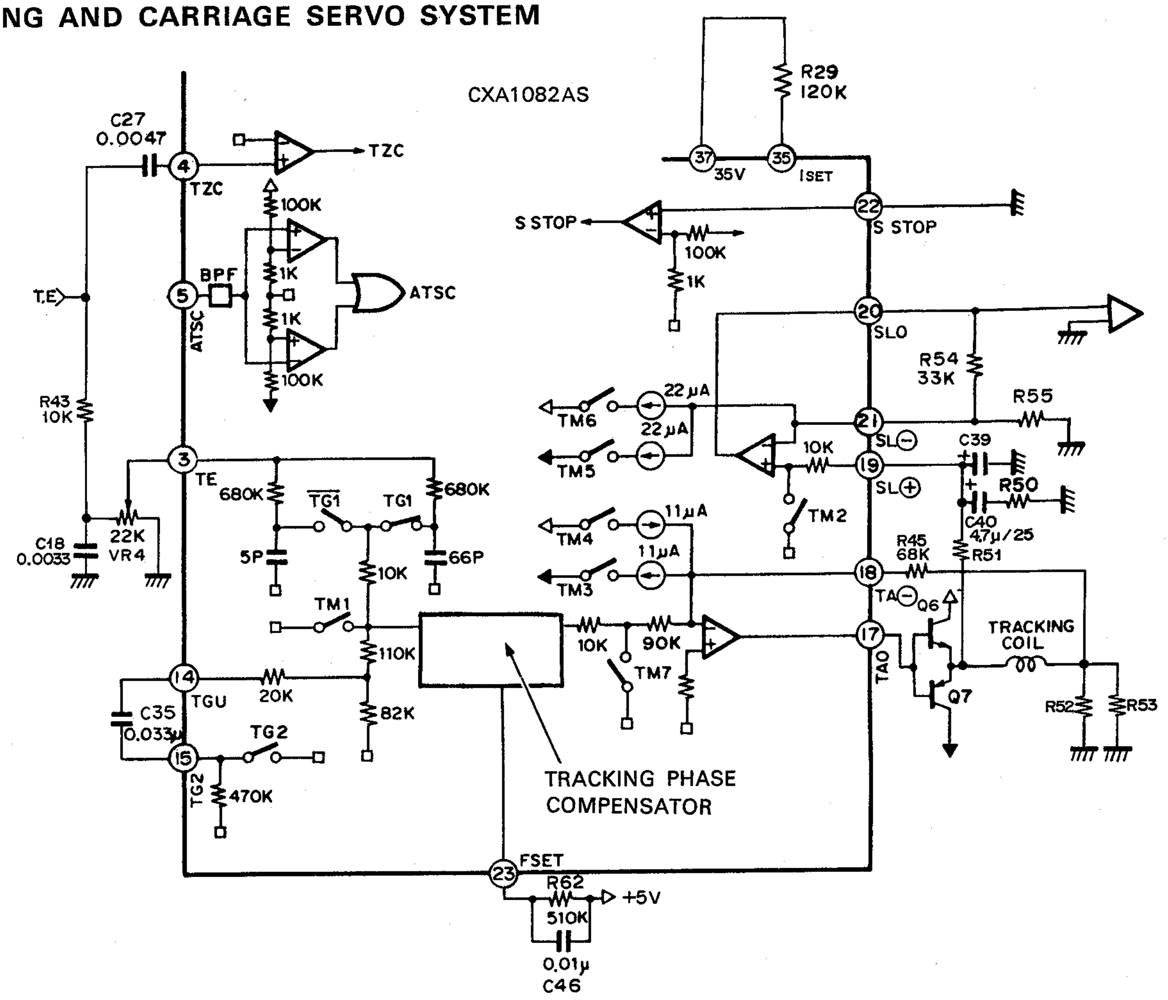

CXA1082AS
C27
0.0047
TZC
TZC
100K
1K
1K
100K
BPF
ATSC
ATSC
T.E
R43
10K
TE
680K
TG1
TG1
680K
5P
66P
10K
C18
0.0033
22K
VR4
TM1
110K
TGU
20K
C35
0.033μ
82K
TG2
TG2
470K
R29
120K
35V
ISET
S STOP
S STOP
100K
1K
SLO
R54
33K
R55
22μA
22μA
TM6
TM5
10K
SLⓈ
SL⊕
C39
R50
TM2
11μA
11μA
TM4
TM3
R45
68K
C40
4.7μ/25
R51
TAⓈ
Q6
10K
90K
TM7
TAO
TRACKING
COIL
Q7
R52
R53
TRACKING PHASE
COMPENSATOR
FSET
R62
510K
+5V
0.01μ
C46
37
35
22
20
21
19
18
17
4
5
3
14
15
23

Fig. 3-3

The above figure is a block diagram of the Tracking and Carriage Servo System (Fig. 3-3).

The capacitor connected between Pins 14 and 15 is a time constant that functions to drop the high-range gain when TG2 is OFF. The peak frequency of the Tracking Phase Compensator is also in reverse proportion to the value of the resistor connected to Pin 23, and its peak value is approximately 1.2 kHz in case of 510 kΩ resistance value.

TM3 or TM4 is switched ON in order to make a tracking jump in the FWD (forward) or REV (reverse) direction, respectively. The peak voltage to be applied to the tracking coil at this time is determined by the current value of TM3 or TM4 and the feedback resistor from Pin 18; that is:

Track Jump Peak Voltage =

$$\text{TM3 (TM4) current value} \times \text{feedback resistance value} \times \frac{\text{TRK coil DCR}}{\text{R52} /\!/ \text{R53}}$$

A FWD or REV carriage kick is performed by switching TM5 or TM6 to ON, respectively. The peak voltage to be applied to the carriage motor at this time is determined by the current value of TM5 or TM6 and the feedback resistor from Pin 21; that is:

Carriage Jump Peak Voltage =

$$\text{TM5 (TM6) current value} \times \text{feedback resistance value} \times \frac{\text{R58}}{\text{R57}}$$

The current value at each SW is determined by the value of the resistor connected to Pins 35 and 36. When its resistance value is 120 kΩ, the respective current values will be as follows:

TM3, TM4 = ±11 μA TM5, TM6 = ±22 μA

SPINDLE SERVO, LPF

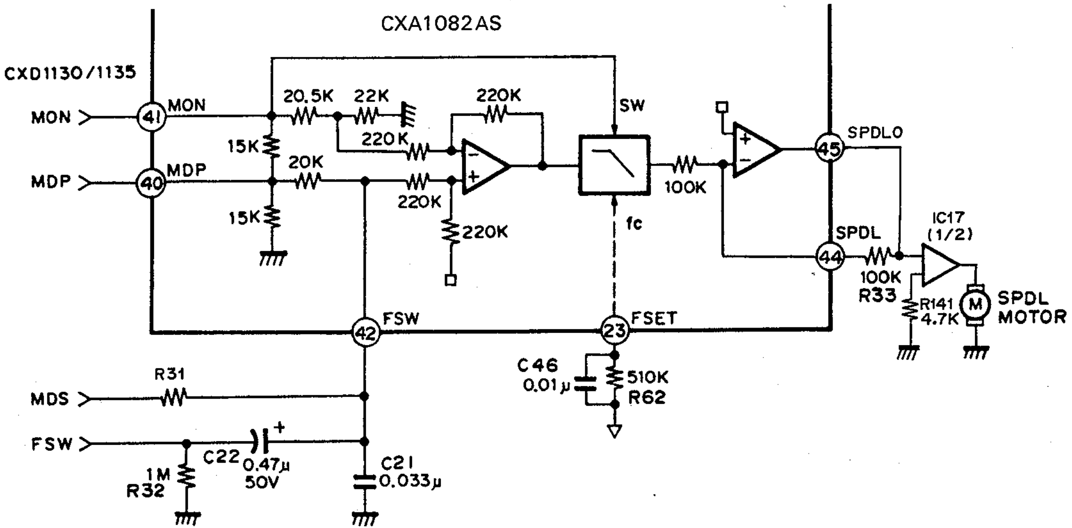

CXA1082AS
CXD1130/1135
MON
41
MON
MDP
40
MDP
20.5K
22K
220K
220K
15K
20K
220K
220K
15K
SW
100K
fc
SPDLO
45
SPDL
44
IC17 (1/2)
100K
R33
R141
4.7K
M
SPDL MOTOR
FSW
42
FSET
23
C46
0.01μ
510K
R62
R31
MDS
FSW
C22
0.47μ
50V
1M
R32
C21
0.033μ

Fig. 3-4

A 200 Hz LPF is formed at the 0.033 μF connected to Pin 42 and 20 kΩ resistor and a secondary LPF is formed at the built-in LPF (Pin 23: fc - 200 Hz with a 510 kΩ resistor, thereby eliminating the carrier components of the CLV Servo Error signals: MDS and MDP.

In CLV-S Mode, FSW goes low and the fc value of the Pin 42 LPF is lowered to further reinforce the filter.

VCO LOOP FILTER, 8.64 MHz VCO

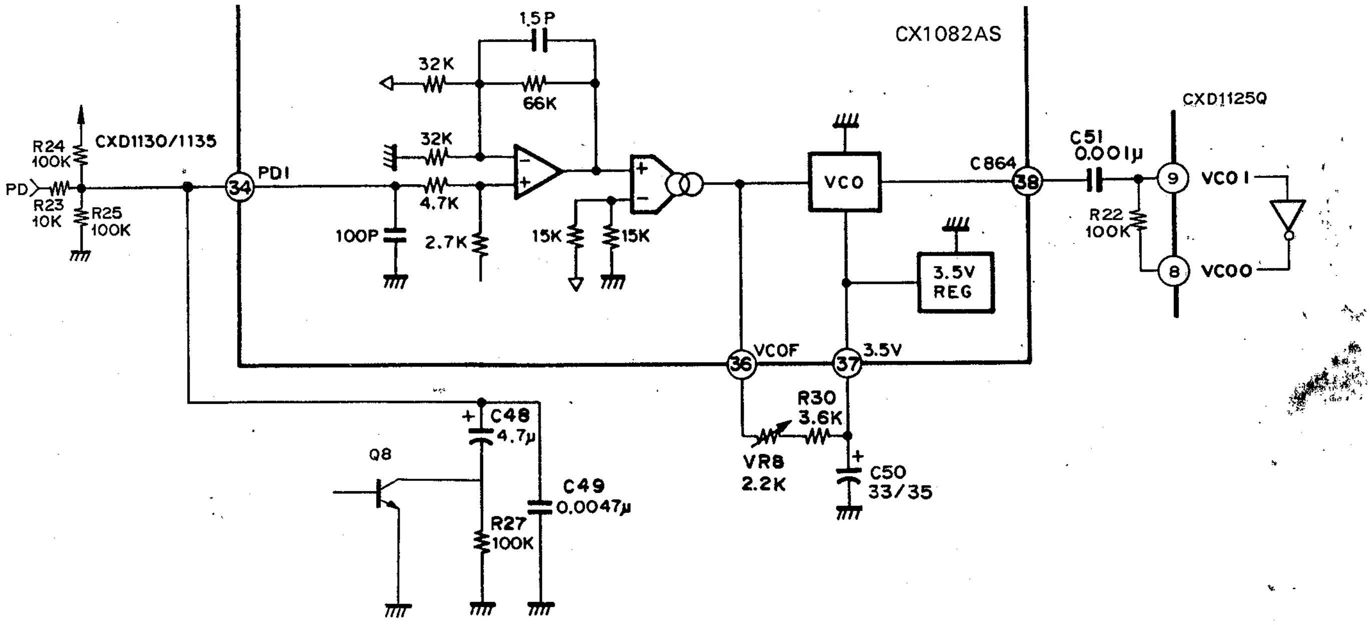

1.5P
32K
66K
CX1082AS
CXD1125Q
R24
100K
CXD1130/1135
PD
R23
10K
R25
100K
PDI
34
32K
4.7K
100P
2.7K
15K
15K
VCO
C864
38
C51
0.001μ
9
VCO I
R22
100K
8
VCOO
3.5V REG
VCOF
36
37
3.5V
R30
3.6K
VR8
2.2K
C50
33/35
C48
4.7μ
Q8
C49
0.0047μ
R27
100K

Fig. 3-5

The phase comparison output PDO which is input from Pin 34 subjected to V-I conversion after having its PWM carrier component eliminated at the Loop Filter. It is then added to the current from Pin 36 which is used for setting the self-modulating frequency in order to control the VCO frequency. The self-modulating frequency of the VCO is approximately in inverse proportion to the value of the resistor between Pins 36 and 37.

COMMAND

The input data used for operating this IC actually consists of eight bits. In the following description, however, each command will be expressed using a two-digit hexadecimal format of $XX (with X ranging from 0 to F).

1. $0X (㉔ SENS = "FZC")

This command is related to the control of the focus servo. Its bit configuration is as follows:

D7	D6	D5	D4	D3	D2	D1	D0
0	0	0	0	FS4	FS3	FS2	FS1

The four focus-related SWs are FS1 to FS4, which respectively correspond to D0 to D3 above.

$00 When FS1=0, Pin 13 is charged to: (22 μA - 11 μA) × 50 kΩ=0.55V.
Moreover, if FS2=0, this voltage is transmitted no further and the ⑪ output becomes 0 V.

$02 In the above status, only FS2 becomes 1. At this time, a negative output is sent from Pin 11. This voltage level is stipulated as follows:
(22 μA - 11 μA) × 50 kΩ × Resistance value between ⑪, ⑫/50 kΩ ....Equation (1)

$03 In the above status, FS1=1 so that the +22 μA power supply is cut off.
Next, the Charge/Recharge circuit of CR is formed, and the voltage of Pin 13 drops with time as shown in Fig. 3-6 below.

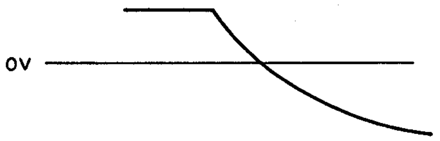


Fig. 3-6. Pin 13 Voltage when FS1 Changes from 0 to 1

This time constant is stipulated by C34 that is externally connected to 50 kΩ.
The alternate issuing of $02 and $03 enables the creation of the serch voltage for focus. (See Fig. 3-7)

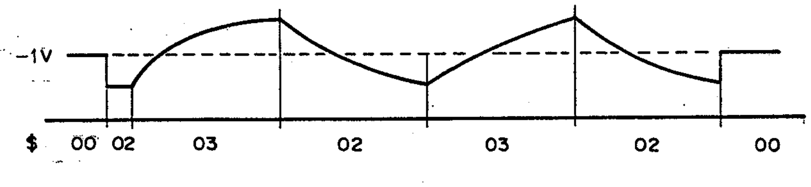


Fig. 3-7. Search Voltage Creation by S02 and S03
(Pin 11 Voltage)

1-1.Description of FS4

This switch is situated between Focus Error input 6 and the Focus Phase Compensator to receive the Focus Servo ON/OFF data.

$00 → $08
Focus OFF ← Focus ON

1-2.Procedure for Applying Focus

The following explanation will presume the below polarities:

(a) The lens searching the disc in the far-to-close direction.
(b) At this time, the output voltage ⑪ changes from negative to positive.
(c) Furthermore, the S-curve of the focus at this time changes according to Fig. 3-8.

The Focus Servo is applied with Point Ⓐ of Fig. 3-8 as its operating point. The Focus Search operation is performed and the Focus Servo SW is set to ON while Point Ⓐ of Fig. 3-8 is being crossed. In order to also prevent malfunction, the logical product of the operation and the Focus OK signal is obtained.

This IC is designed so that FZC (Focus Zero Cross) will be output - as the signal which indicates the crossing of Point Ⓐ - from the ㉔ SENS pin. In addition, the Focus OK signal is output as an indication that focus is being applied (or can be applied in this case).

To summarize the above, the focus will be optimally applied in accordance with the time chart below.

Actually, as the auto-sequence of this IC is used, the system μ-COM only sends $47 at Point Ⓑ. (Refer to page 16 for auto-sequence.)

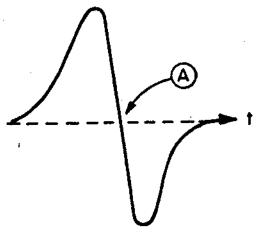
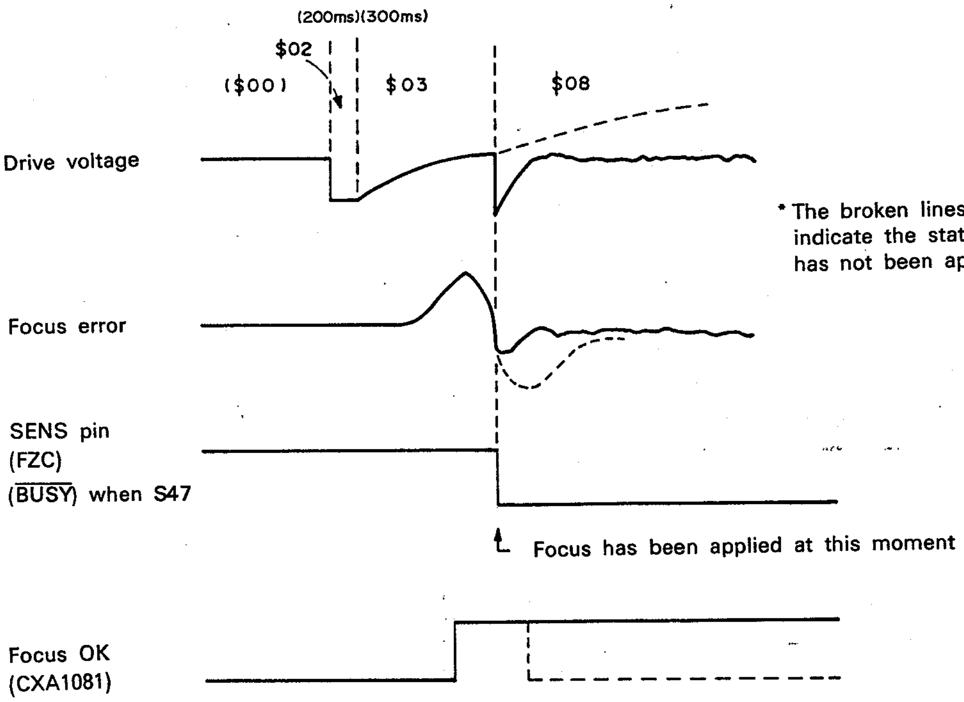


Fig. 3-8. S-Curve of the Focus



* The broken lines within this figure indicate the status in which focus has not been applied.

Fig. 3-9. Timing Chart of the Focus ON Operation

1-3.The ㉔ SENS Pin

The data which is output by the SENS pin will vary according to the input data as follows. Actually, as Focus IN and TRACK JUMP are performed by the auto-sequence. The output of system μ-COM CXA1082AS is only $4X BUSY. (Refer to page 16 for auto-sequence.)

$0X input → FZC output
$2X input → TZC
$1X input → AS
$3X input → SSTOP
$4X input → BUSY
$5X-$7X input → HIGH-Z

Since any data above $7X is a command code of CXD1135, its connection with the "SENS" pin of CXD1135 will permit the output of various types from a single pin.

2. $1X (㉔ SENS = "AS")

This command is related to the ON/OFF status of TG1, TG2 and the Break circuit. Its bit configuration is as follows:

D7	D6	D5	D4	D3	D2	D1	D0
0	0	0	1	ANTI SHOCK ON/OFF	Break circuit ON/OFF	TG2	TG1

Brake circuit description

These switches are used to switch the Up/Normal status of the Tracking Servo gain. Because the Servo circuit exceeds the linear range after performing a 100- or 10-track jump, the settling of the actuator becomes extremely bad such that it will, for example, return after jumping only ten tracks, although a 100-track jump was intended, and such phenomena will frequently occur. It is the Break circuit, however, that functions prevent such occurrences. By exploiting the 180° phase offset between the RF envelope and the tracking error due to the direction of the actuator transversing the tracks along the radius from the inner to outer tracks and its reverse direction, the Break circuit cuts out the unnecessary portion of the tracking error and applies a break.

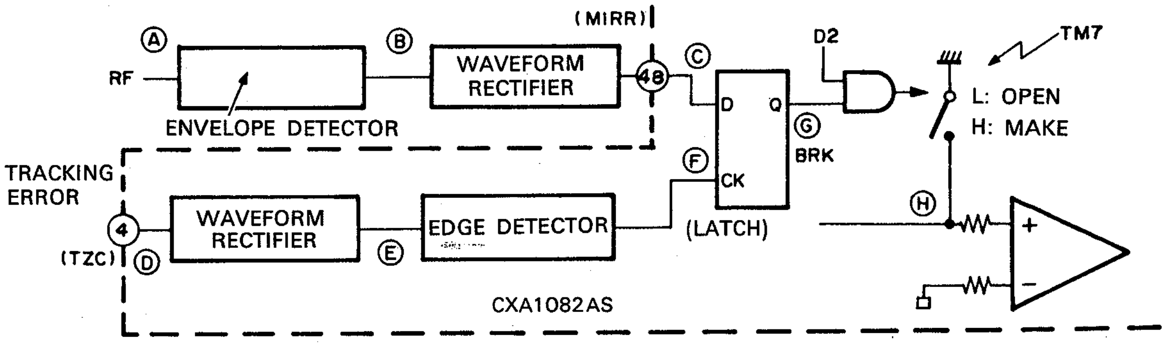

Ⓐ
Ⓑ
RF
ENVELOPE DETECTOR
WAVEFORM RECTIFIER
(MIRR)
48
Ⓒ
D
Q
CK
Ⓕ
Ⓖ
BRK
(LATCH)
D2
TM7
L: OPEN
H: MAKE
Ⓗ
+
-
TRACKING ERROR
4
(TZC)
Ⓓ
WAVEFORM RECTIFIER
EDGE DETECTOR
Ⓔ
CXA1082AS

Fig. 3-10. TM7 Operation (Break Circuit)

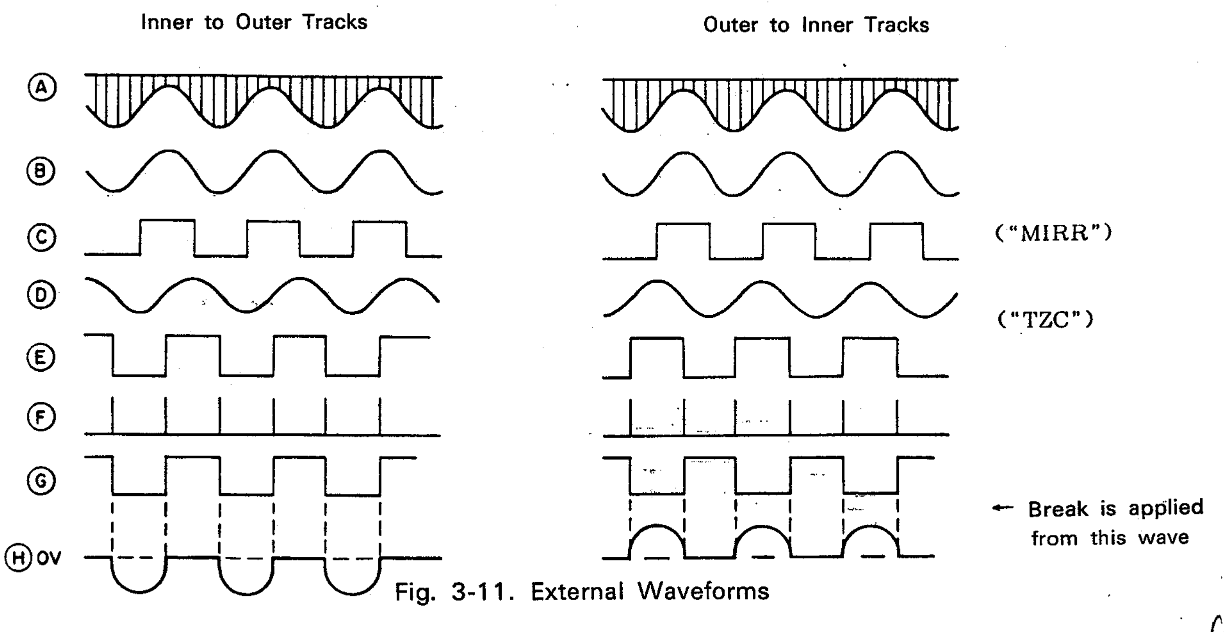

Inner to Outer Tracks
Outer to Inner Tracks
Ⓐ
Ⓑ
Ⓒ
Ⓓ
Ⓔ
Ⓕ
Ⓖ
Ⓗ OV
("MIRR")
("TZC")
← Break is applied from this wave

Fig. 3-11. External Waveforms

3. TRACK JUMP

These CD players performs tracking jumping of 1, 10, 50, and 100 tracks by the auto-sequence of CXA1082AS. The auto-sequence allows TRACK JUMP and FOCUS IN to be made simply sending the auto-sequence serial data once the timing data has been sent from the system μ-COM to the CXA1082AS RAM in advance.

Fig. a through d shows track jumps of 1, 10, 50 and 100 and the timing chart for auto-sequence.

Time control of A through D in the Fig. is made by the system μ-COM setting $5X.

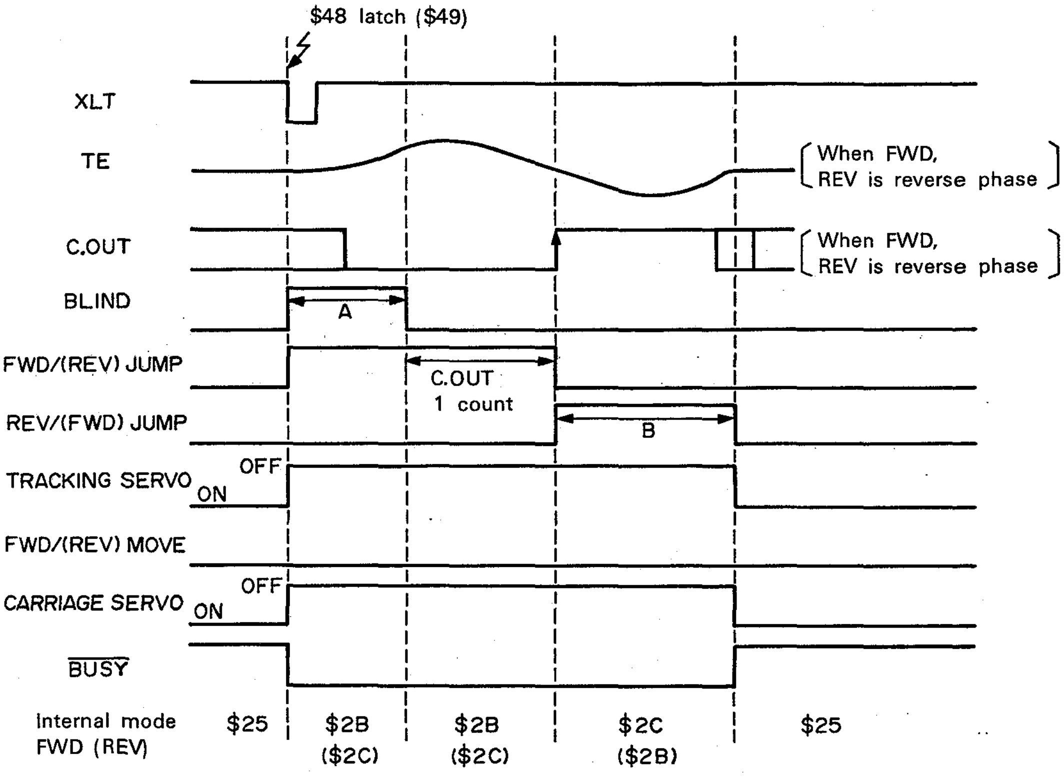
The auto-sequence is started by sending $4X as shown in the table below.

	D3	D2	D1	D0
CANCEL	0	0	0	0
FOCUS ON	0	1	1	1
1 TRACK JAMP	1	0	0	×
10 TRACL JAMP	1	0	1	×
100 or 50 TRACK JAMP	1	1	0	×

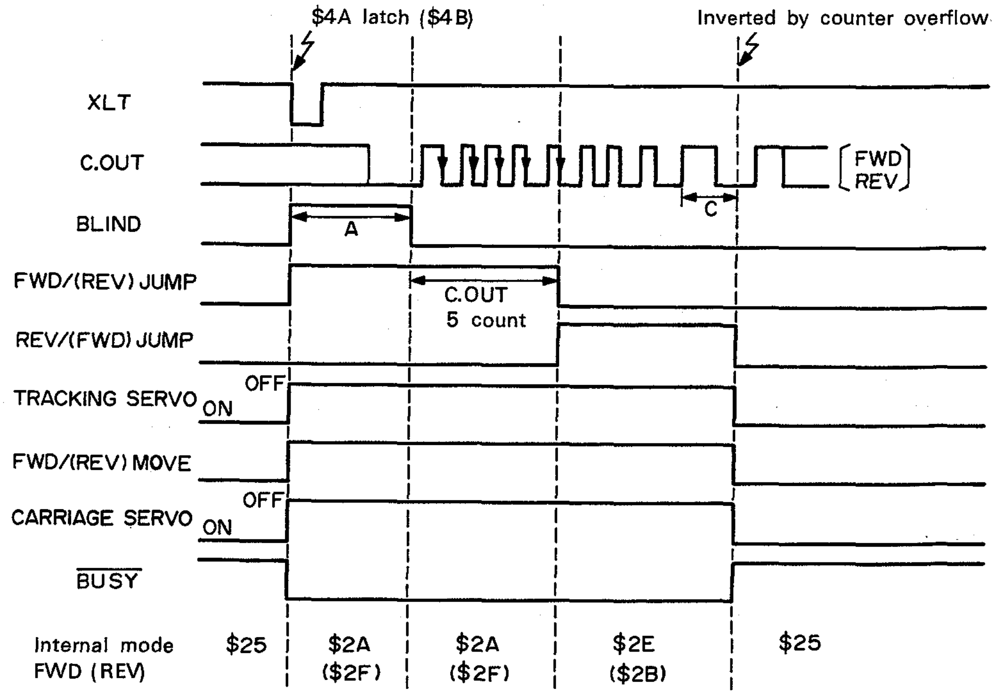
× = 0 FOWARD
× = 1 REVERSE

Auto-sequence Timing Chart

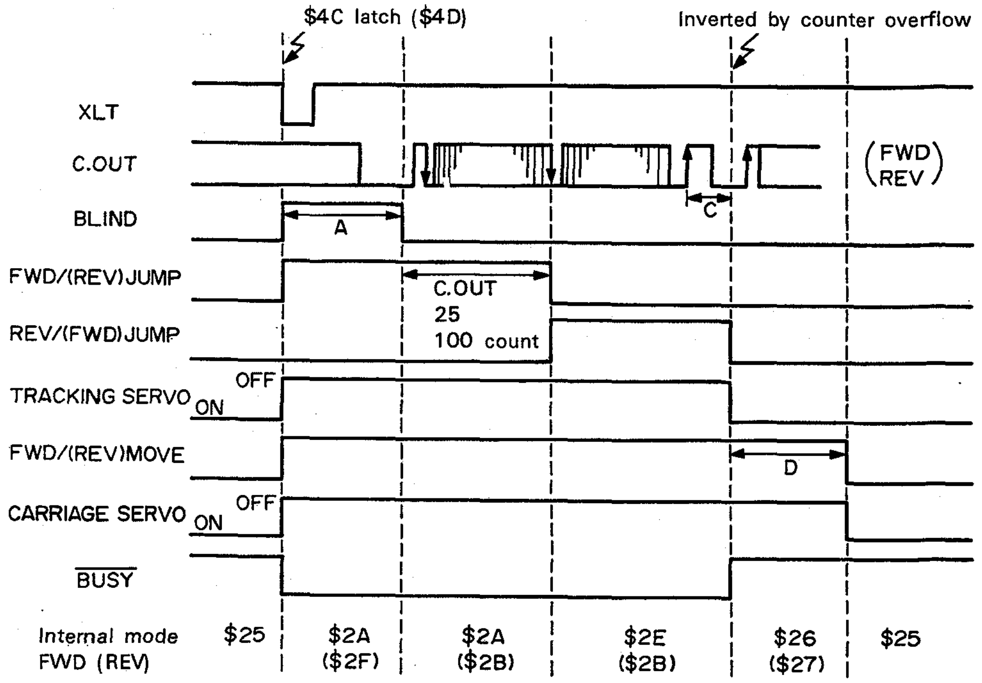
(a) 1 Track Jump


$48 latch ($49)
XLT
TE
When FWD, REV is reverse phase
C.OUT
When FWD, REV is reverse phase
BLIND
A
FWD/(REV) JUMP
C.OUT 1 count
REV/(FWD) JUMP
B
TRACKING SERVO
OFF
ON
FWD/(REV) MOVE
CARRIAGE SERVO
OFF
ON
BUSY
Internal mode FWD (REV)
$25
$2B ($2C)
$2B ($2C)
$2C ($2B)
$25

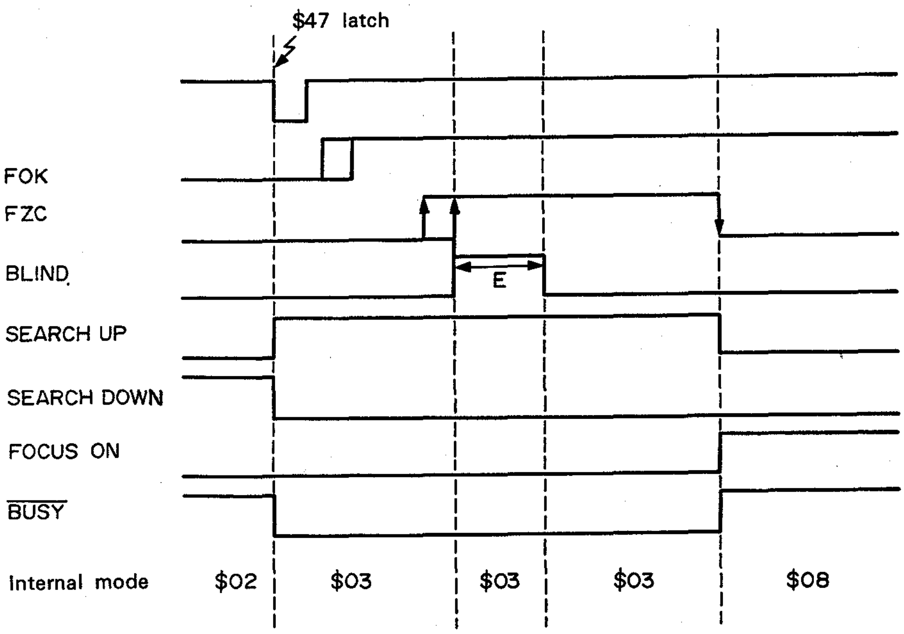
(b) 10 track jump


$4A latch ($4B)
Inverted by counter overflow
XLT
C.OUT
FWD
REV
C
BLIND
A
FWD/(REV) JUMP
C.OUT
5 count
REV/(FWD) JUMP
OFF
TRACKING SERVO
ON
FWD/(REV) MOVE
OFF
CARRIAGE SERVO
ON
BUSY
Internal mode
FWD (REV)
$25
$2A
($2F)
$2A
($2F)
$2E
($2B)
$25

(c) 50
100 track jump


$4C latch ($4D)
Inverted by counter overflow
XLT
C.OUT
FWD
REV
C
BLIND
A
FWD/(REV)JUMP
C.OUT
25
100 count
REV/(FWD)JUMP
OFF
TRACKING SERVO
ON
FWD/(REV)MOVE
D
OFF
CARRIAGE SERVO
ON
BUSY
Internal mode
FWD (REV)
$25
$2A
($2F)
$2A
($2B)
$2E
($2B)
$26
($27)
$25

(d) Auto-focus


$47 latch
FOK
FZC
BLIND
E
SEARCH UP
SEARCH DOWN
FOCUS ON
BUSY
Internal mode
$02
$03
$03
$03
$08

Note: The horizontal axis of this timing chart may not be proportional to the actual time.

3.2.2 CXA1081S

RF AMP

The output voltage of the photodiode that is input to the input pins (PD1 and PD2) is respectively subjected to voltage amplification of approx. five times into a 58kΩ equivalent resistor at the RF I-V Amps (1) and (2). Furthermore, addition is performed at the RF Summing Amp so that the output voltage which has been converted from the currents of the photodiodes (A + B + C + D) is output from Terminal RFO. An eye pattern check can be performed at Terminal RFO.

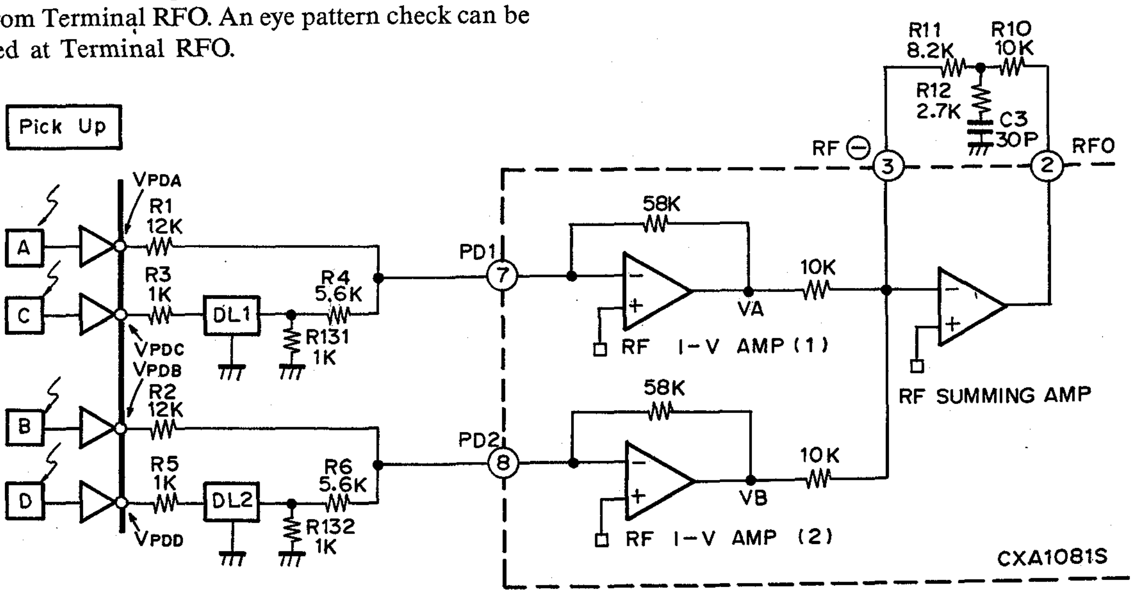

Pick Up
A
C
B
D
VPDA
R1
12K
R3
1K
DL1
VPDC
R4
5.6K
R131
1K
VPDB
R2
12K
R5
1K
DL2
VPDD
R6
5.6K
R132
1K
PD1
7
PD2
8
58K
VA
RF I-V AMP (1)
58K
VB
RF I-V AMP (2)
10K
10K
RF ⊖
3
R11
8.2K
R10
10K
R12
2.7K
C3
30P
2
RFO
RF SUMMING AMP
CXA1081S

Fig. 3-12

The low-frequency component of the RFO output voltage V_{RFO} is as follows:

$$V_{RFO} = 1.8 \times (VA \times VB)$$

$$= 1.8 \times \frac{58\ k}{12\ k} \times (V_{PDA} + V_{PDB} + V_{PDC} + V_{PDD})$$

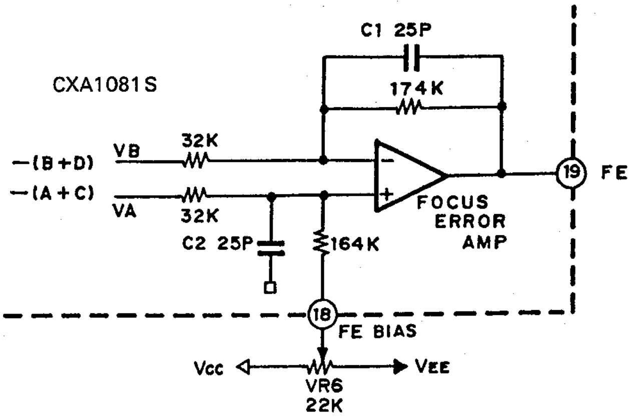

C1 25P
174K
CXA1081S
32K
VB
−(B+D)
−(A+C)
VA
32K
C2 25P
164K
FOCUS
ERROR
AMP
19
FE
18
FE BIAS
Vcc
VEE
VR6
22K

Fig. 3-13

FOCUS ERROR AMP

This amp obtains the difference between the output (VA) of the RF I-V Amp (1) and the output (VB) of the RF I-V Amp (2), then outputs the voltage which has been converted from the currents of the photodiodes (A + C − B − D).

The FE output voltage (low frequency) is as follows:

$$V_{FE} = 5.4 \times (VA - VB)$$
$$= 5.4 \times \frac{58\ k\Omega}{12\ k\Omega} \times (V_{PPA} + V_{PDC} - V_{PDB} - V_{PDD})$$

TRACKING ERROR AMP

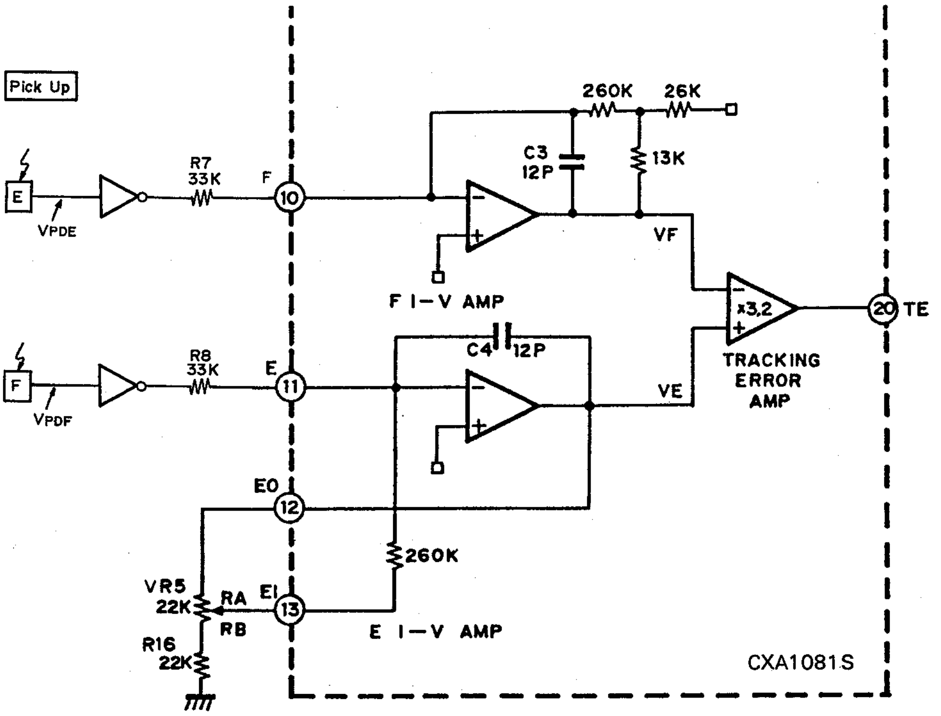

Pick Up
E
VPDE
R7
33K
F
10
F
VPDF
R8
33K
E
11
EO
12
EI
13
260K
26K
C3
12P
13K
VF
F I−V AMP
C4
12P
VE
x3.2
20
TE
TRACKING
ERROR
AMP
260K
VR5
22K
RA
RB
R16
22K
E I−V AMP
CXA1081S

Fig. 3-14

The voltage of photodiodes for the side spots input to Terminals E and F are respectively subjected to voltage amplification at the E I-V and F I-V Amps. That is:

$$VF = \frac{403\ k\Omega}{33\ k\Omega} \times V_{PDF}$$

$$VE = [260\ k\Omega \times RA/(RB + 22\ k\Omega) + (RA + 260\ k\Omega)]/33\ k\Omega \times V_{PDE}$$

Furthermore, the output difference between the E I-V and F I-V Amps is obtained at the Tracking Error Amp in order to obtain the output voltage that has been converted from currents of the photodiodes (E - F) as follows:

$$VTE = (VE - VF) \times 3.2$$
$$= (V_{PDE} - V_{PDF}) \times \frac{403\ k\Omega}{33\ k\Omega} \times 3.2$$

FOCUS OK CIRCUIT

The Focus OK circuit functions to create the window for the timing of switching ON the Focus Servo from the Focus Search status.
With respect to the RF signal of Pin ②, both its HPF signal and the reciprocal of the LPF output (inverted phase) from the Focus OK Amp output are obtained at Pin 1.
The Focus OK output is inverted in the case below:

$V_{RFI} - V_{RFO} \doteqdot -0.39V$

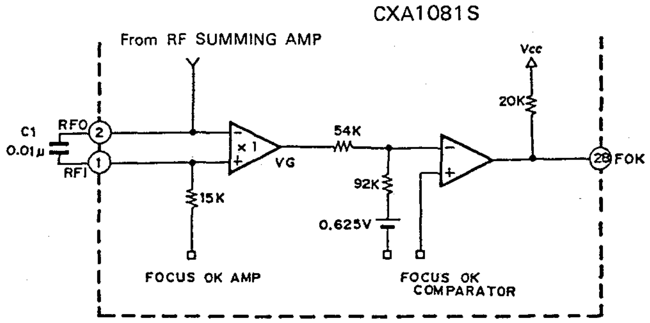

CXA1081S
From RF SUMMING AMP
Vcc
20K
C1
0.01μ
RFO
RFI
②
①
×1
VG
54K
92K
0.625V
15K
㉘
FOK
FOCUS OK AMP
FOCUS OK COMPARATOR

Fig. 3-15

MIRROR CIRCUIT

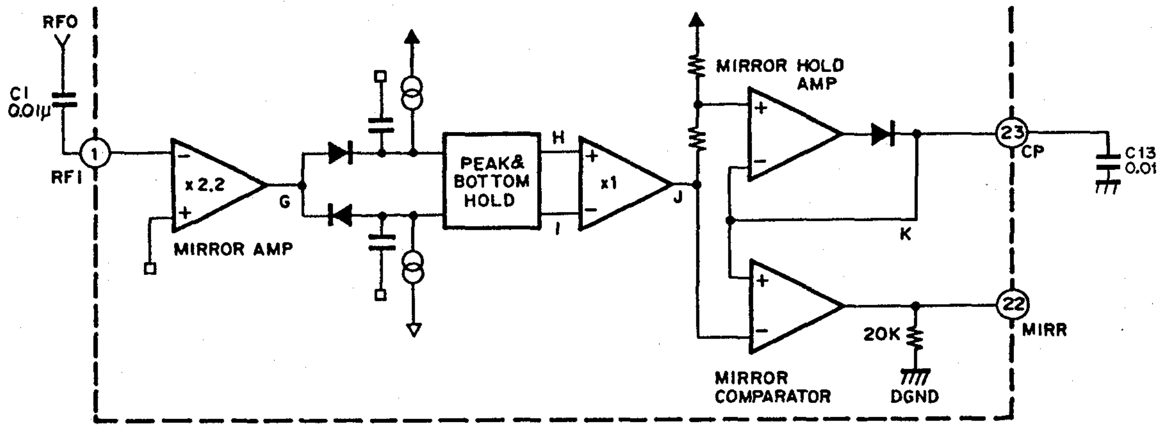

RFO
C1
0.01μ
RFI
①
x2.2
MIRROR AMP
G
PEAK& BOTTOM HOLD
H
I
x1
J
MIRROR HOLD AMP
K
MIRROR COMPARATOR
20K
DGND
㉓
CP
C13
0.01
㉒
MIRR

Fig. 3-16

After amplifying the RFI signal, the Mirror circuit performs Peak Hold and Bottom Hold.
Peak Hold will hold the peak value at a time constant that is capable of tracking even a 30 kHz Traverse signal, whereas Bottom Hold will hold the bottom value at a time constant that is capable of tracking even the envelope fluctuations of revolving cycles.

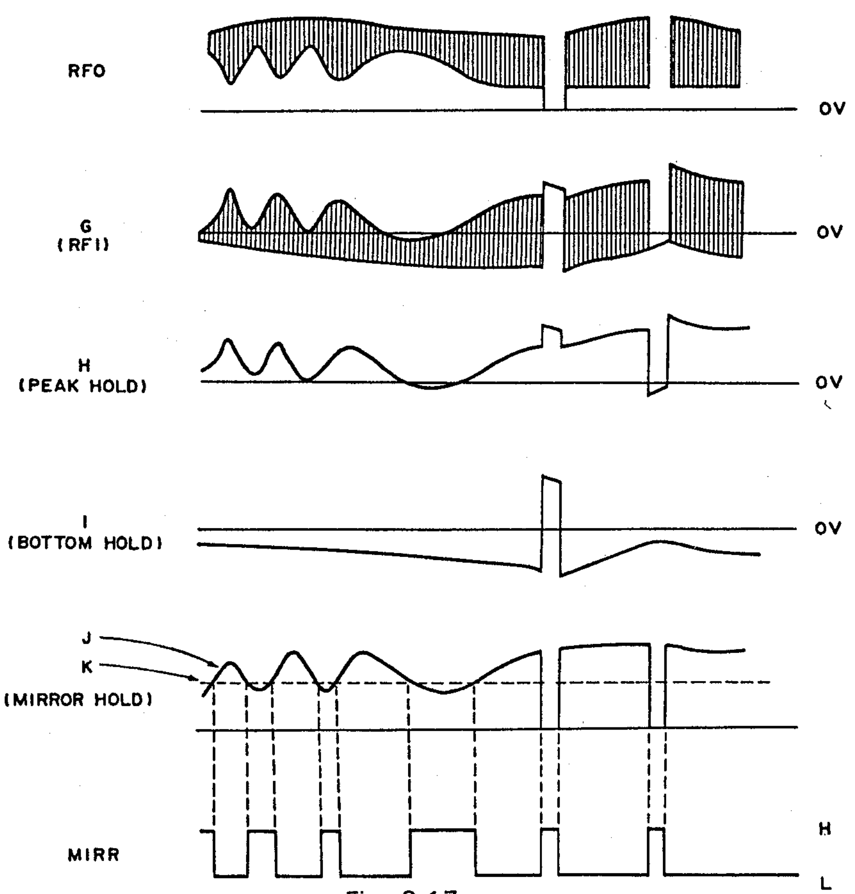


Fig. 3-17

The DC-replayed Envelope signal J is obtained from the differential amplitude of these Peak and Bottom Hold signals, H and I. The Mirror output is obtained by comparing this signal J with the signal K which has been held at peak level, using a time constant of a a level that is two-thirds that of the peak value. In other words, the Mirror output is "L" upon a disc track or "H" between disc tracks (the Mirror section). Moreover, the Mirror output is also "H" when a defect has been detected.

EFM COMPARATOR

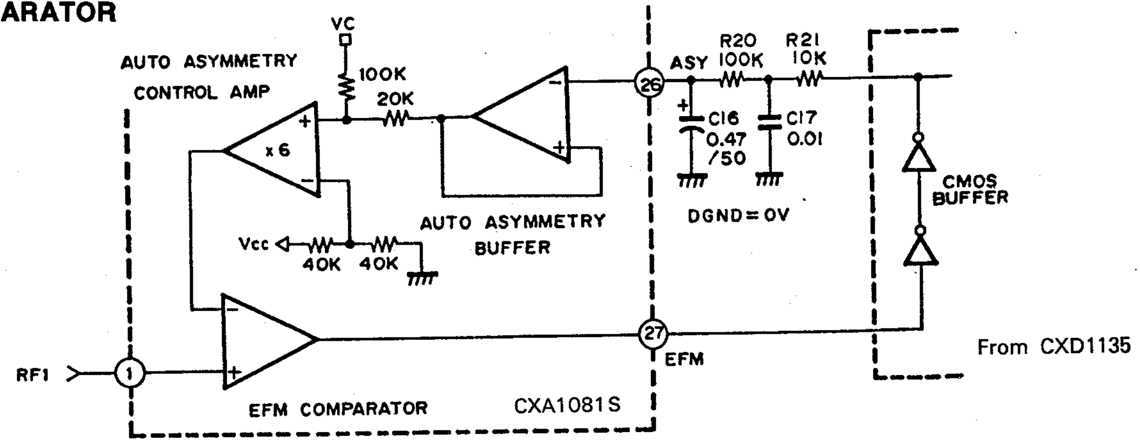

VC
AUTO ASYMMETRY
CONTROL AMP
100K
20K
x 6
AUTO ASYMMETRY
BUFFER
Vcc
40K
40K
RF1
1
EFM COMPARATOR
CXA1081S
26
ASY
R20
100K
R21
10K
C16
0.47
/50
C17
0.01
DGND=0V
CMOS
BUFFER
27
EFM
From CXD1135

Fig. 3-18

The EFM Comparator functions to convert the RF signals into binary signals. The asymmetry caused by variance during disc manufacuture cannot be eliminated merely by AC coupling. Consequently, the reference voltage of the EFM comparator is controlled by exploiting the respective 50% probability of a 1 or 0 occurring as the value of a binary-coded EFM signal.

Note that since this EFM Comparator is of power-current SW type, its H and L levels will not equal the supply voltage, feedback is applied through the decoder C-MOS buffer.
R20, R21, C16, and C17 serve as a LPF for obtaining the DC of (Vcc + DGND)/2 [V].

DEFECT CIRCUIT

After inverting the RFI signal, the Defect circuit performs Bottom Hold using two time constants, one long and one short. The Bottom Hold performed by the short time constant sends a response at a mirror-surface defect on the disc that is 0.1 ms or longer. The Bottom Hold performed using the long time constant continues holding the mirror surface at the level preceding the defect. The Mirror Defect Detection signal is generated by performing a fine plus level shift of that mirror level by use of C coupling, then making a comparison of both signals.

This signal is used to mute the tracking error when the DEFECT output is "H" to improve the playability.

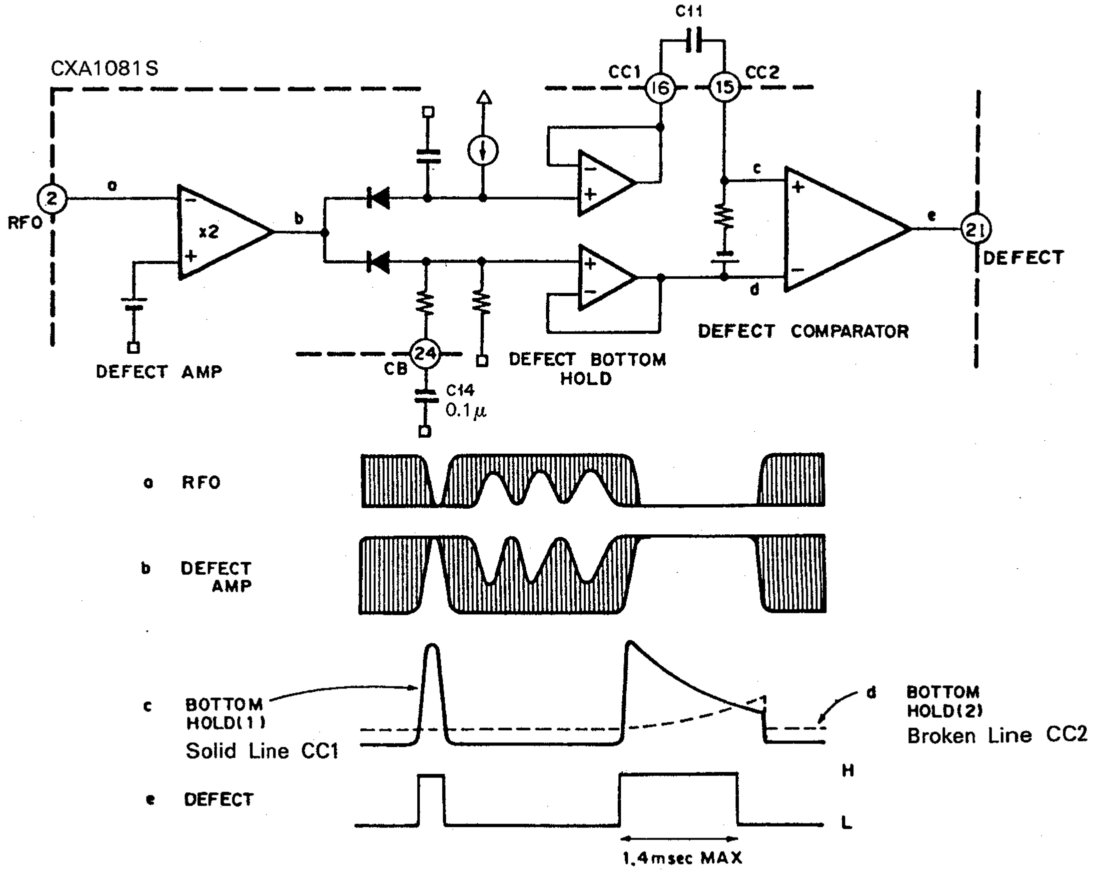

C11
CXA1081S
CC1
16
15
CC2
2
RFO
a
x2
b
c
e
21
DEFECT
d
DEFECT COMPARATOR
DEFECT AMP
24
CB
DEFECT BOTTOM HOLD
C14
0.1μ
a RFO
b DEFECT AMP
c BOTTOM HOLD(1)
Solid Line CC1
d BOTTOM HOLD(2)
Broken Line CC2
e DEFECT
H
L
1.4msec MAX

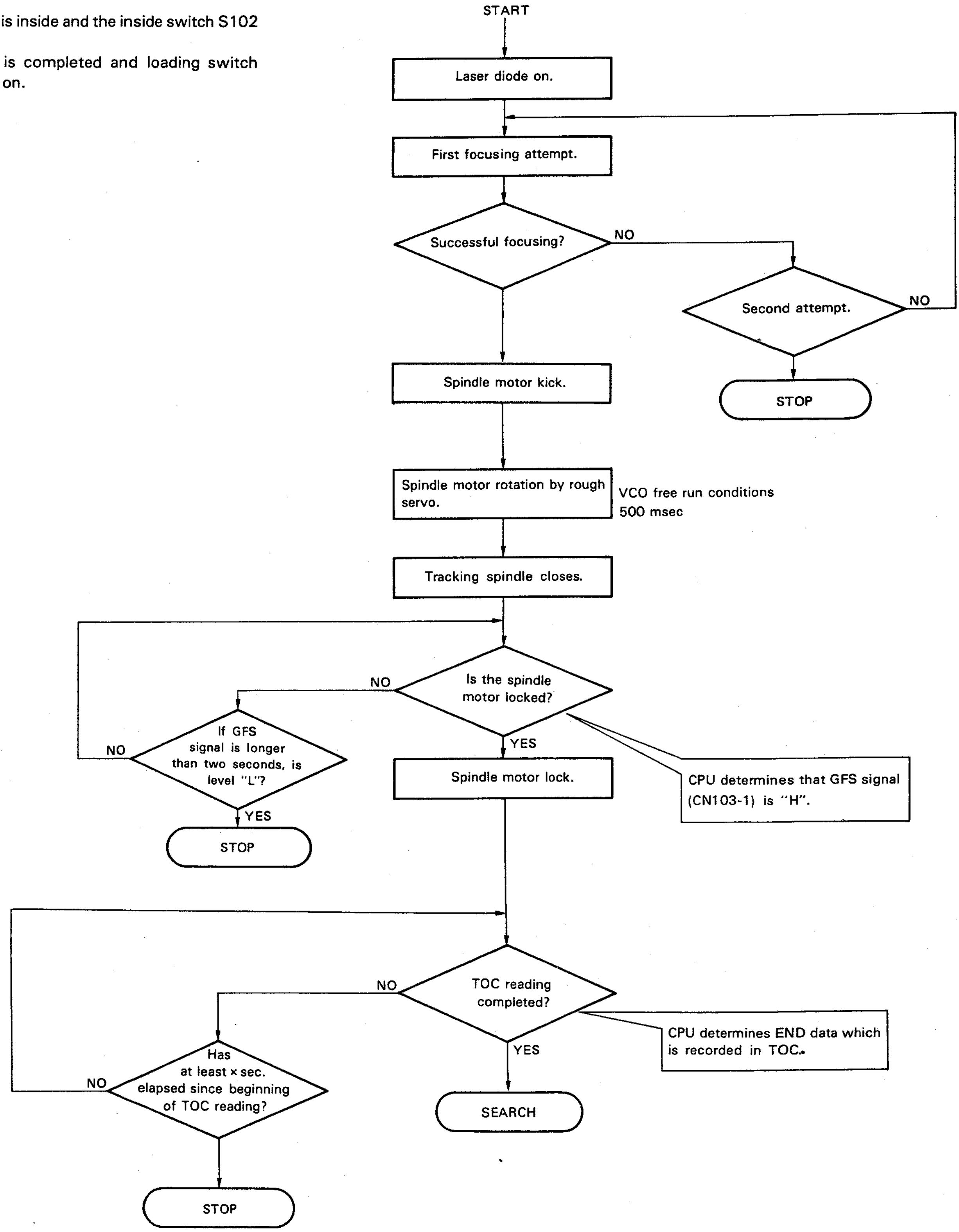
Fig. 3-19

3.3 TOC READING

Initial Settings for Reading of Table of Contents

Conditions:

- ★ Carriage is inside and the inside switch S102 is on.
- ★ Loading is completed and loading switch S101 is on.


START
Laser diode on.
First focusing attempt.
Successful focusing?
NO
Second attempt.
NO
STOP
Spindle motor kick.
Spindle motor rotation by rough servo.
VCO free run conditions
500 msec
Tracking spindle closes.
Is the spindle motor locked?
NO
If GFS signal is longer than two seconds, is level "L"?
NO
YES
STOP
YES
Spindle motor lock.
CPU determines that GFS signal (CN103-1) is "H".
TOC reading completed?
NO
Has at least × sec. elapsed since beginning of TOC reading?
NO
STOP
YES
SEARCH
CPU determines END data which is recorded in TOC.

3.4 CARRIAGE SERVO SYSTEM

The carriage servo system inputs the drive voltage for the tracking actuator. The required carriage movement components are obtained by the carriage servo equalizer as shown in Fig. 3-20.

The carriage locate operation is performed by obtaining the locate voltage by converting the internal current of the CXA1082AS into serial data. This voltage is approximately 6V but during starting and when locked, a limit of 200 mA is applied to the output current dropping the potential to less than 6V.

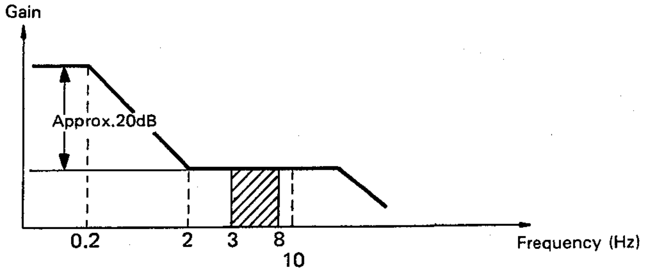


Fig. 3-20

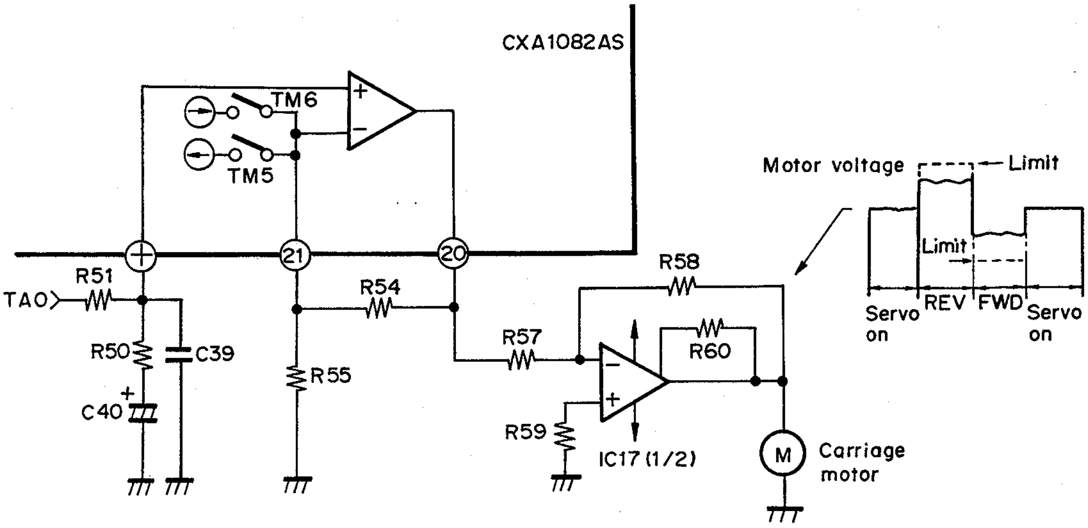

CXA1082AS
TM6
TM5
21
20
R51
TAO
R54
R58
R57
R60
R50
C39
R55
C40
R59
IC17 (1/2)
M
Carriage motor
Motor voltage
Limit
Limit
Servo on
REV
FWD
Servo on

Fig. 3-21

3.5 DEMODULATOR

The demodulator is composed primarily of LSI CXD1135Q; it also includes a small amount of added-on circuits. Its functions are:

1. Bit clock regeneration using the EFM-PLL circuit.
2. Demodulation of the EFM data.
3. Detection, protection and internal extension of the frame sync signal.
4. Thorough error detection and correction.
5. Interpolation using averaging or previous value hold.
6. Demodulation of the sub-code and error detection for sub-code Q.
7. CLV servo for the spindle motor.
8. 8-bit tracking counter.
9. CPU interface using the serial bus.
10. Built-in 35th digital filter.

4. OPTICAL PATH IN THE PICK-UP

4-1 OPTICAL PATH AND OPTICAL PARTS

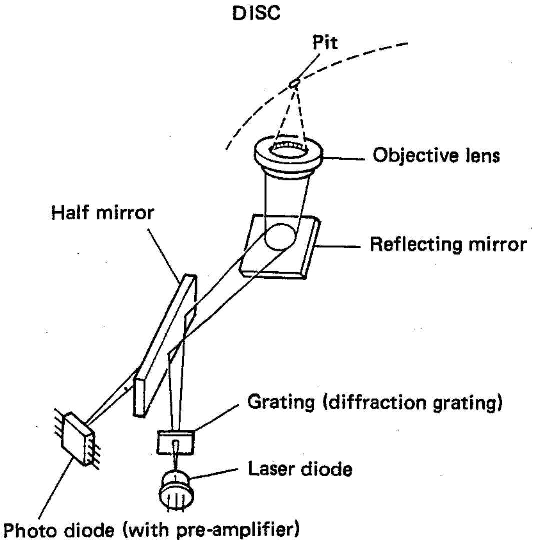

DISC
Pit
Objective lens
Half mirror
Reflecting mirror
Grating (diffraction grating)
Laser diode
Photo diode (with pre-amplifier)

Fig. 4-1

Fig. 4-1 shows the configuration of this pick-up's optical part.

The wavelength of the light emitted from the laser diode is between 780 and 790 nm. The light is barely visible. This light source is spread into an ellipse from an ultra-small emission point. The light expands at a set angle.

The emitted light goes through a grating and is divided into three beams of 0 step and ±1 step.

The other beams of ±2, 3, and n steps are also present, but are lost and not used. When the light reaches the half mirror, 50% is reflected. The remaining light permeates the half mirror and is lost.

The light then goes to the reflecting mirror where all the light is reflected to the objective lens (finite type).

Since this pick-up's objective lens uses a finite system (finite because the LD's convergence distance is finite), a collimator lens is unnecessary. The old models objective lenses are called infinite type. The light that is converged on an ultra-small diameter spot by these objective lenses is reflected by the disc and returns to the objective lens. Then it goes through the half mirror where 50% of it returns to the laser diode. The remaining 50% of light goes through and reaches the photo diode.

This has been a general outline of the optical path. The features of each part are explained in the following section.

4-2 FEATURE OF EACH PART

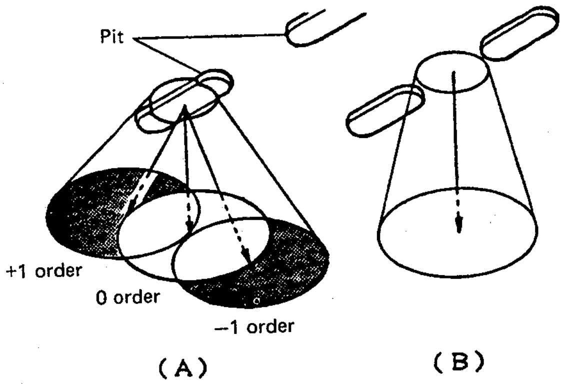


Fig. 4-2

(1) Laser diode (LD)

The size of previously-used LDs was 9ϕ. However, a newly-developed LD with a size of 5.6ϕ has been introduced. This has resulted in a compact and lightweight optical path.

(2) Objective lens

The collimator lens has been replaced by the finite objective lens which has a finite convergence distance for the LD's optical path. This has resulted in lower costs while preserving high performance.

The finite objective lens, like the conventional infinite lens, is a high-performance lens designed to attain sufficient optical performance even when the optical parts are not parallel within the optical path.

(3) Half mirror

The light that returns to the objective lens goes through the half mirror. Since the half mirror is a glass plate, it is known that astigmatism is created for the light which enters at an angle. The old model similarly used a glass plate and had a device in its optical part to cancel this astigmatism. Whereas, this new pick-up uses the astigmatism advantageously for the focus servo.

Consequently, the multi-lens used in previous models has not been incorporated in this new pick-up. This has resulted in lower costs while preserving high performance. At the same time, the points of parts have been reduced, improving dispersion and reliablity.

(4) Axle-sliding actuator

The position accuracy of the objective lens is an important factor for the optical pick-up. The pick-up has a sliding axle for the actuator which drives the objective lens. Accurate and stable positioning of the objective lens is thus attained, resulting in stable trackability. Also, a smooth frequency response with low resonance is also realized as with the conventional spring-supported type.

(5) Resin body

The CD body has been made with computer-simulated technology. To keep body changes to a minimum, resin has been incorporated. Due to the mounting, materials were carefully selected and the same reliability as the previously-used aluminum has been realized.

The use of resin has made possible mounting configurations that were not possible with aluminum. Therefore the use of adhesives has been greatly reduced for improved reliability.

4-3 RF and servo signal

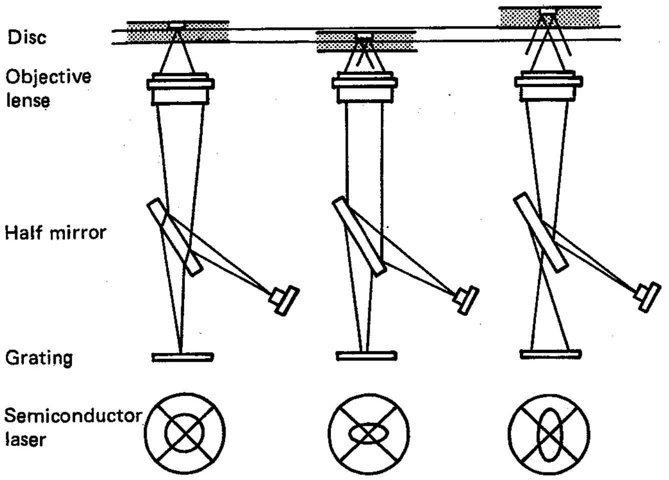


Fig. 4-3

(2) RF and servo signals

The beam, which has been reduced to an extremely small spot by the objective lens, now strikes the disc side on which the signal is located. Part of the beam is then reflected back to the objective lens and photo diode. A diagram showing how this beam is reflected off the disc is shown in figure 4-2. (A) shows what happens when the concentrated beam is directed at a pit. Normally, this reflected light would disrupt the output light beam. In the laser diodes used in CD players, however, noise is reduced instead, resulting in stable performance. This property is very advantageous for the half prism which allows only half of the light energy to pass.

A pit and (B) shows the same beam when reflected from a space between pits. In case (A), the beam is diffracted, so the dark part of the beam does not return to the objective lens. Instead, only the center of the beam passes through the objective lens and reaches the photo diode. In case (B), there is no diffraction because the beam does not strike a pit. Therefore, the entire beam is reflected back to the photo diode, producing brighter beam than when a pit is reached. In this system, the data on the disc, which is represented by pits, is covered into an electrical signal at the photo diode according to the intensity (brightness) of the reflected beam. The RF signal is then produced from this electrical signal by the computation circuit.

Fig. 4-3 shows how the focus signal is detected. (1) is when the beam from the laser diode is accurately focused on the disc by the objective lens. (2)shows what happens when the disc comes closer to the pickup and (3) shows what happens when the disc moves farther away. The grating and concave lens, which have no direct effect on the focusing are not shown in the diagram.

In case (1), the beam emanating from point 01 is reflected and diffracted on the disc surface to produce the condensed beam (02). In case (2), the beam is directed at a point farther than that of beam 02. Fig. 4-4 shows the properties of the half mirror. 1 through 7 shows the shape of the beam at each point. Between points 2 and 6, which are in a straight line, the beam is circular at point 4. Point 6 corresponds to beam 02 of fig. 4-3. If we assume that fig. 4-4 shows mode (1) of fig. 4-3, that means the beam is circular because the photo diode is located at point 4. In mode (2) of fig. 4-3, the location of the photo diode is closer to the cylindrical lens than it was in fig. 4-4. That means the shape of the beam is the same as that of point 3 (an ellipse that has a longer width than height). In mode (3) of fig. 4-3, the shape of the beam is that of point 5, an ellipse that has a longer height than width.

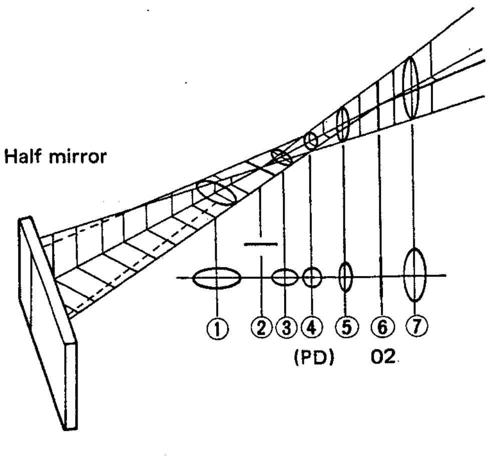


Fig. 4-4 Half mirror

These beam shapes are shown in fig. 4-3. By performing a (A + C) – (B + D) computation using the A-D photo diode quartering elements, the focus signal is produced.

Let's consider what happens as the objective lens is gradually moved closer to the disc. If the objective is fairly far from the disc, only a small amount of light will be returned to the photo diode. Furthermore, since the returning light is quartered, the focus signal would be 0.

If the objective lens is moved closer to the disc until point 7 of fig. 4-4 is reached, the shape of the beam at the photo diode becomes an ellipse that is higher than it is wide.

The focus signal would then be positive because (A + C) is greater than (B + D). However, after the peak (vertical line) is reached at point 6, it begins to return to zero. If it becomes zero at point 4, the beam becomes an ellipse that is wider than it is high because (A + C) is less than (B + D) and the focus signal becomes negative. After peaking at point 2, the focus signal returns to zero just as when the objective lens is too far from the disc. Focusing signals produced in the above manner are shown in fig. 4-5. Due to its shape, this is called an S-curve, an important graph that expresses the properties of the focus signal.

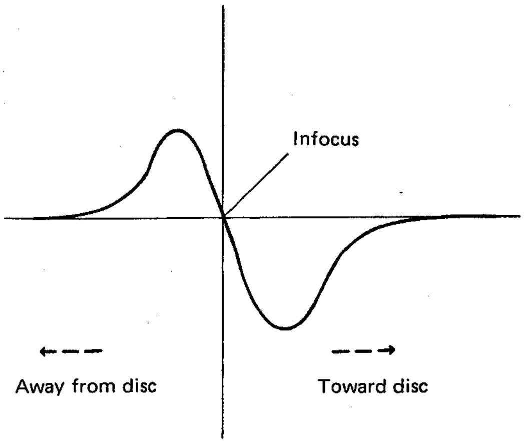


Fig. 4-5 S-curve

Since the real purpose of the focus servo is to maintain the focus signal at zero, only a tiny section at the center of the S-curve appears as residual error.

Fig. 4-6 shows how the tracking signal is detected. The beam from the laser diode is divided into three beams. The ± 1 order beams on either side of the 0 order beam are used to produce the tracking signal. These two beams are, like the 0 order beam, are directed at the disc in a tiny spot. In principle, the spots of the two side beams are an equal distance from the center spot as shown in fig. 4-6. (The actual distance is much greater than that shown in the figure.) These two side beams are reflected and diffracted and returned to their respective detection elements in the photo diode. If these two elements detect the same intensity from both beams, it can be assumed that the primary (0 order) beam is correctly following the line of pits on the disc. Fig. 4-7 shows the relationship between the track and the output of each photo diode element (A, B and C).

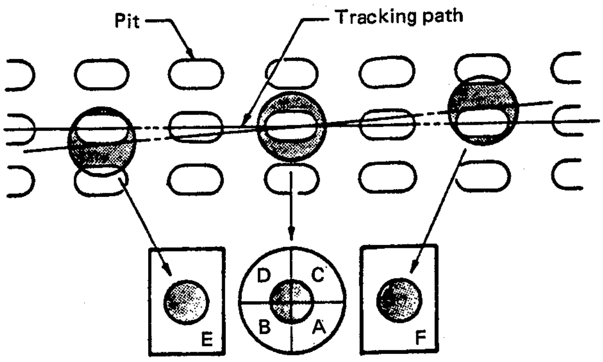


Fig. 4-6 Detection of tracking error

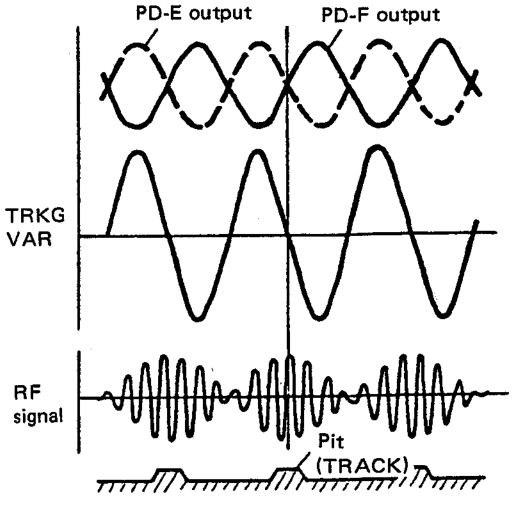


Fig. 4-7 Tracking error and the RF signal

5. DESCRIPTION OF MECHANISM

5.1 OUTLINE

The PD-M40 and PD-M50 are magazine type CD players.
The sections relating to mechanical operations consist of:

1. State detecter section
2. Disc select mechanism
3. Disc counter section
4. Loading mechanism

Circuit block diagram is shown in Fig. 5-1.

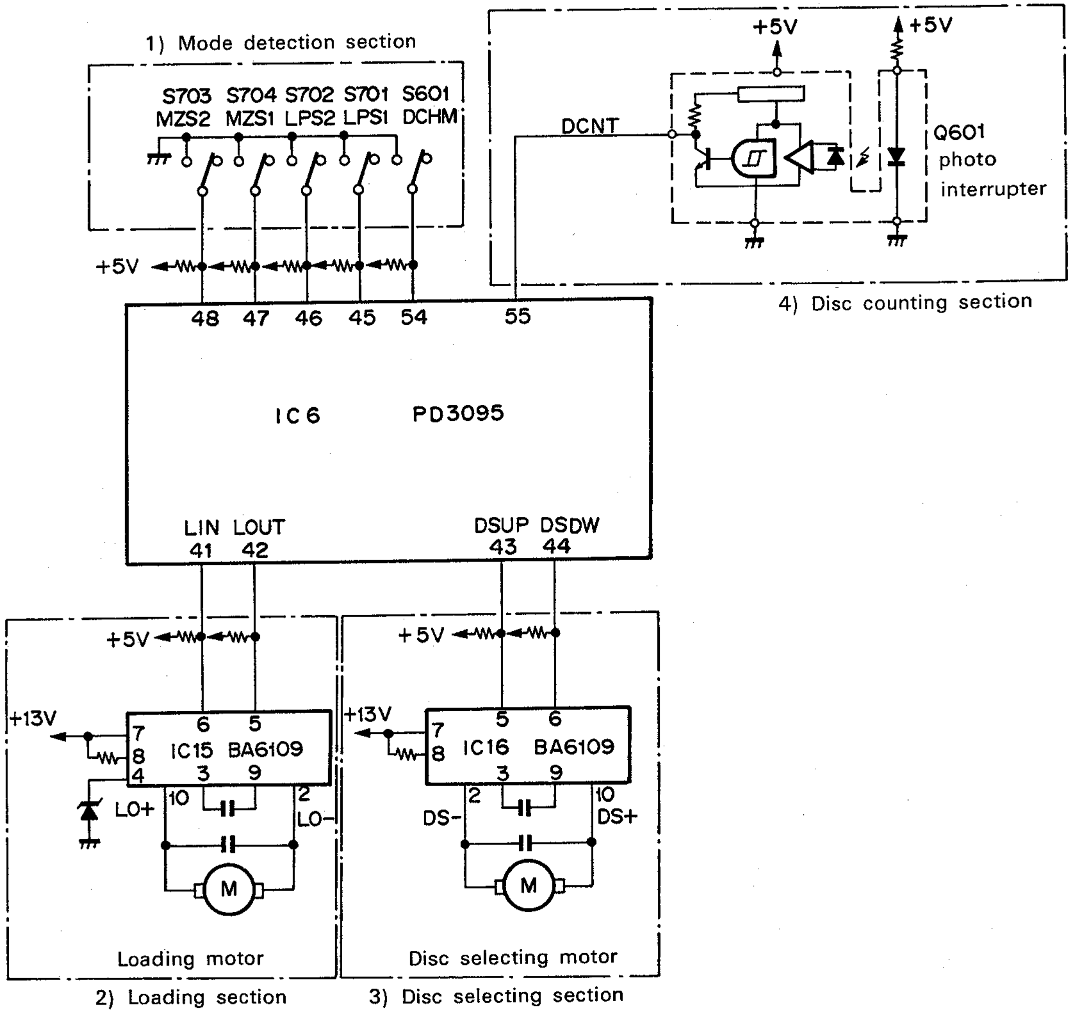

1) Mode detection section
S703 MZS2
S704 MZS1
S702 LPS2
S701 LPS1
S601 DCHM
+5V
48 47 46 45 54 55
DCNT
+5V
+5V
Q601 photo interrupter
4) Disc counting section
IC6 PD3095
LIN LOUT
41 42
DSUP DSDW
43 44
+5V
+13V
7 8 4 6 5 3 9 10 2
IC15 BA6109
LO+
LO-
M
Loading motor
2) Loading section
+5V
+13V
7 8 5 6 3 9 2 10
IC16 BA6109
DS-
DS+
M
Disc selecting motor
3) Disc selecting section

Fig. 5-1 Circuit block diagram

Descriptions of each section appear below.

5.2 Mode Detection Section

The block which detects the mode from the respective SWs and introduces to the input port of the system control microcomputer IC6.

MZS1 }
MZS2 } Existence / Non-existence of magazine and detection of kinds

H	L	L
L	H	L
Magazine is non-existent	6-sheet magazine	1-sheet magazine

LPS1 }
LPS2 } Loading mode detection

H	L	L	H
H	H	L	L
STOP	During loading	Clamp mode	During ejection

DCHM
Home detection of disc selection mechanism

H	L
Home position	Others

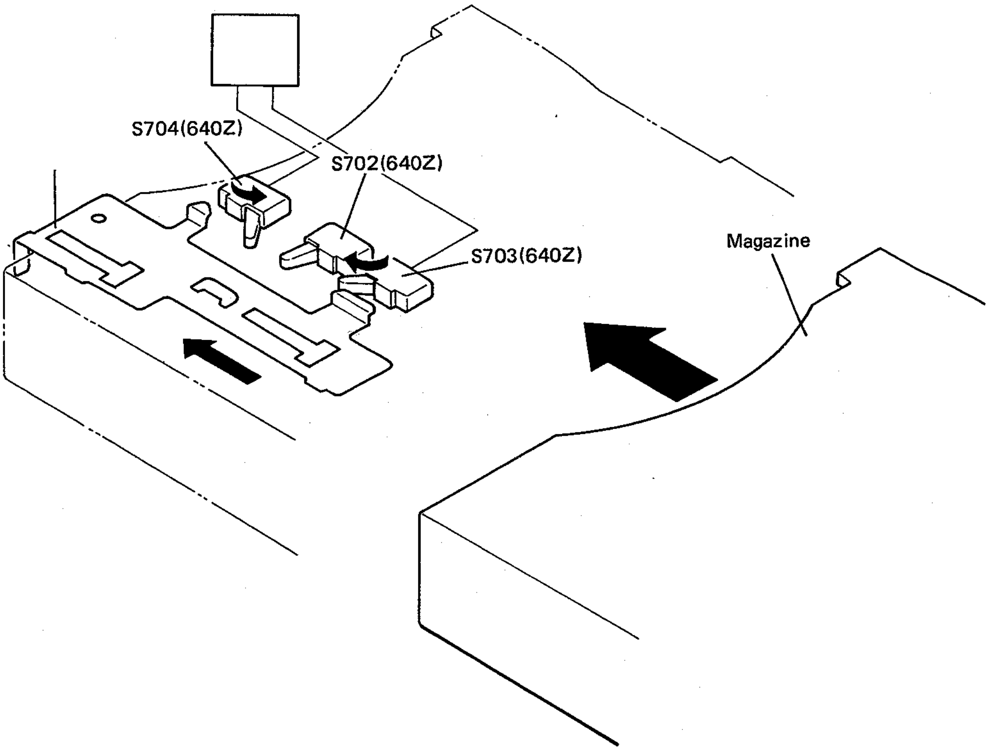


Fig. 5-2

5.3 Disc Selection Section

It consists of the disc selecting motor, which moves the loading mechanism section and clamp mechanism section up and down by adjusting them to the tray position, in order to select an arbitrary tray from the magazine, motor driver IC16, and system control microcomputer IC6 .

Assuming that the direction to operate the loading mechanism section and clamp mechanism section from the first sheet to the sixth sheet of the 6-sheet magazine is normal rotation direction and the reverse direction is the reverse rotation direction, the motor is driven with the following logic.

	Motor normal rotation	Motor reverse rotation	Stop
DS UP IC6 43PIN	H	L	H
DS DW IC6 44PIN	L	H	H
DS+IC16 10PIN	L	+Vcc	L
DS−IC16 2PIN	+Vcc	L	L

+Vcc: Motor control voltage

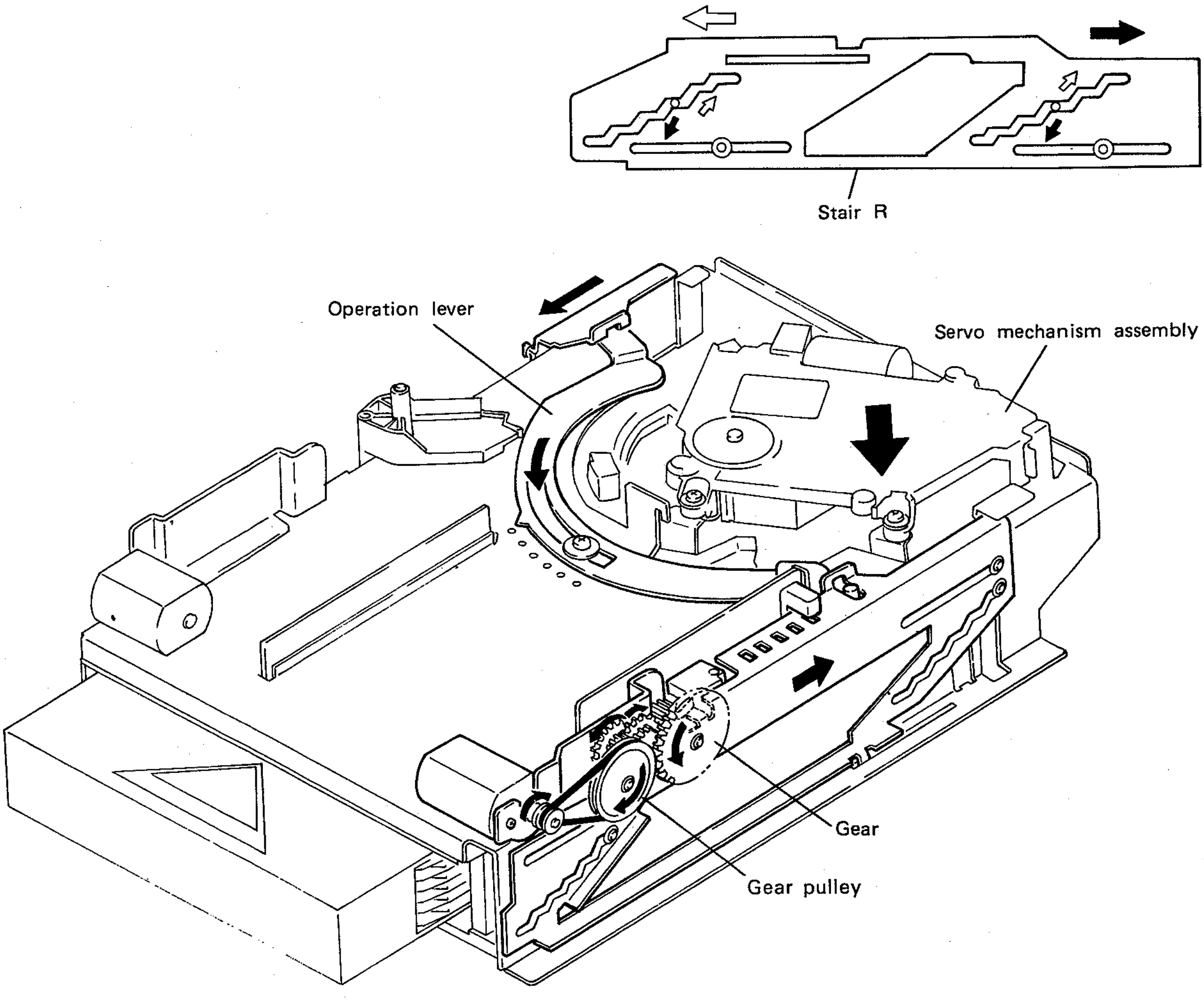


Fig. 5-3

5.4 Disc Counting Section

When the loading mechanical section moves up and down due to the disc selection motor, simultaneously the Q601 photo interrupter detects the positions of the first tray to sixth tray.

The tray position is detected through the windows of the stair which are provided between the photo interrupter and the slits.

When this counted number and the selected disc number are matched, the disc selection motor is stopped.

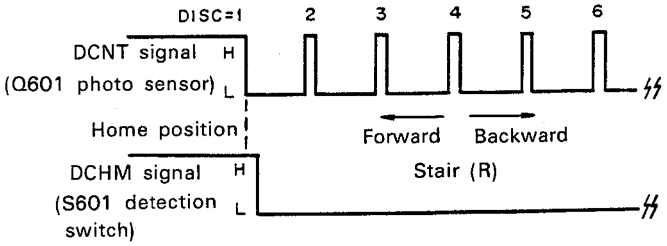

DISC=1
2
3
4
5
6
DCNT signal H
(Q601 photo sensor) L
Home position
Forward
Backward
Stair (R)
DCHM signal H
(S601 detection L
switch)

Fig. 5-4 Disc count pulse

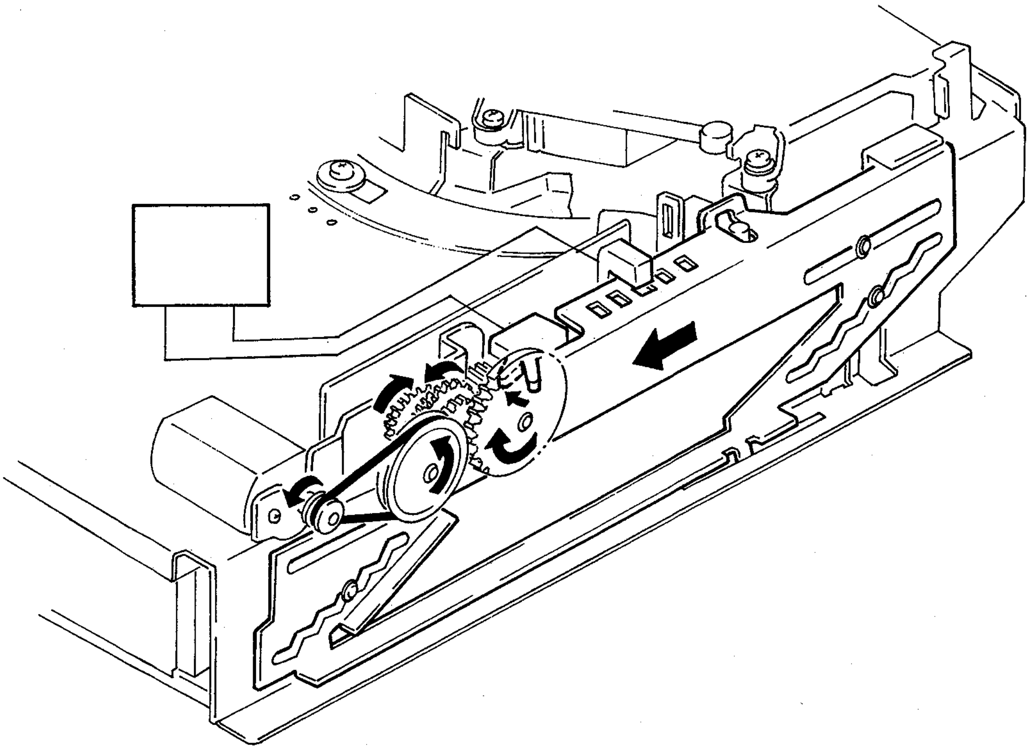


Fig. 5-5

5.5 Loading Section

The loading motor performs the following operations:

① Pulls out an arbitrary tray from the magazine and sets the disc to clamp mode.
② Restores the disc, which has been in the clamp mode, to the tray and stores in the magazine.
③ Ejects the magazine from the main body.

① is performed by turning the loading motor normally. ② and ③ are performed by turning the loading motor reversely. This operation is to receive the binary of logic, which is output from pins 41 and 42 of the system control microcomputer IC6, and to output the motor control voltage from the output pin of IC15.

	Motor normal rotation	Motor reverse rotation	Stop
L IN IC6 41PIN	H	L	H
L OUT IC6 42PIN	L	H	H
LOAD+IC15 10PIN	+Vcc	L	L
LOAD−IC15 2PIN	L	+Vcc	L

+Vcc: Motor control voltage

Operation ① becomes completed when LPS2 (S702) becomes "L" from "H" (clamp mode).
Operation ② becomes completed when LPS1 (S701) becomes "H" → "L" → "H" (loading home position).
Operation ③ becomes completed when LPS2 becomes "H" by rotating the loading motor normally after rotating it reversely unitl it becomes "H" at MZS1 (S704) and becomes "L" at MZS2 (S703).

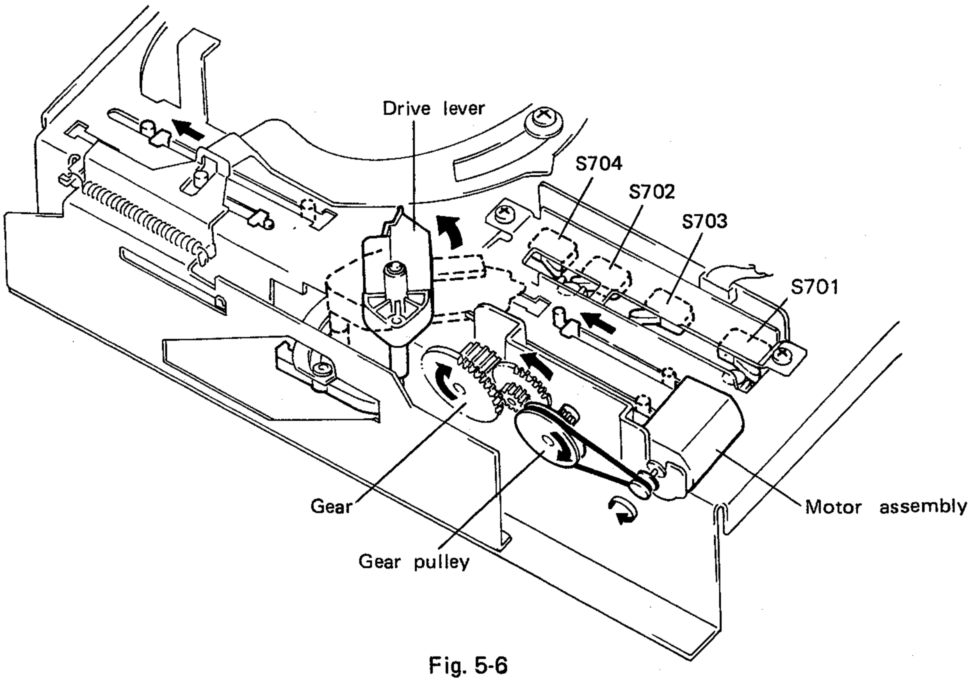


Fig. 5-6

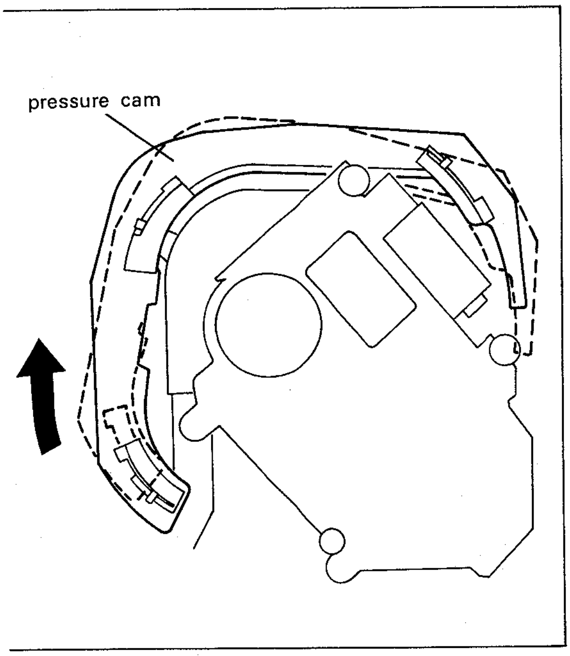

pressure cam

Fig. 5-7

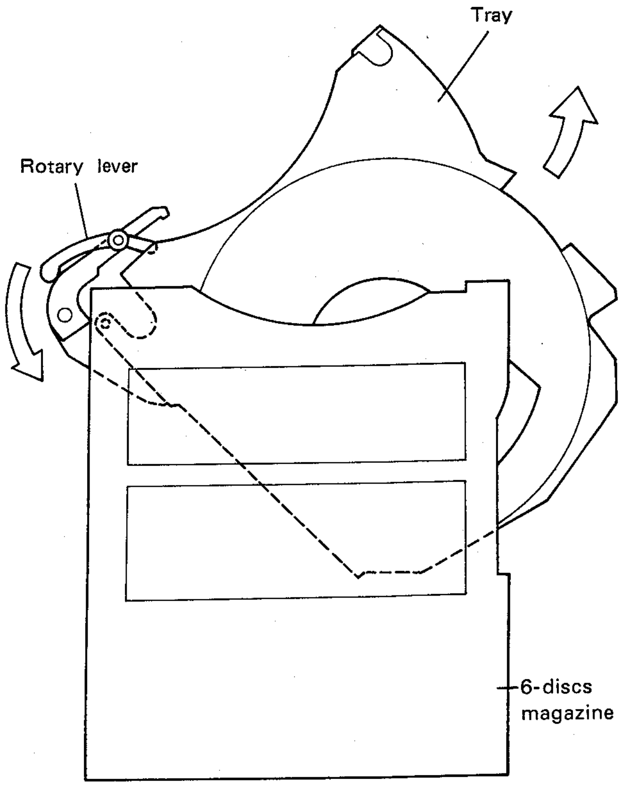

Tray
Rotary lever
6-discs magazine

Fig. 5-8

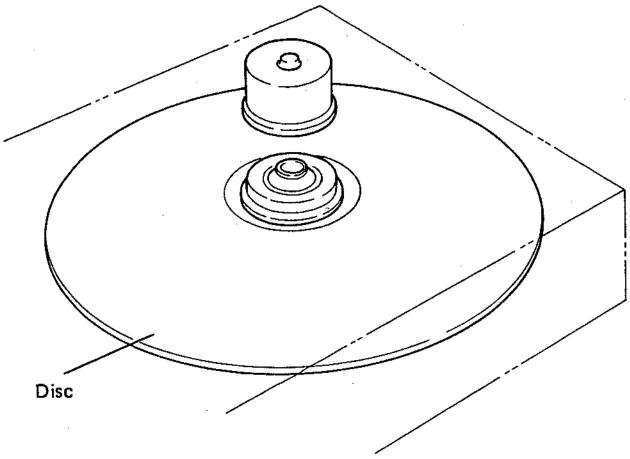


Fig. 5-9

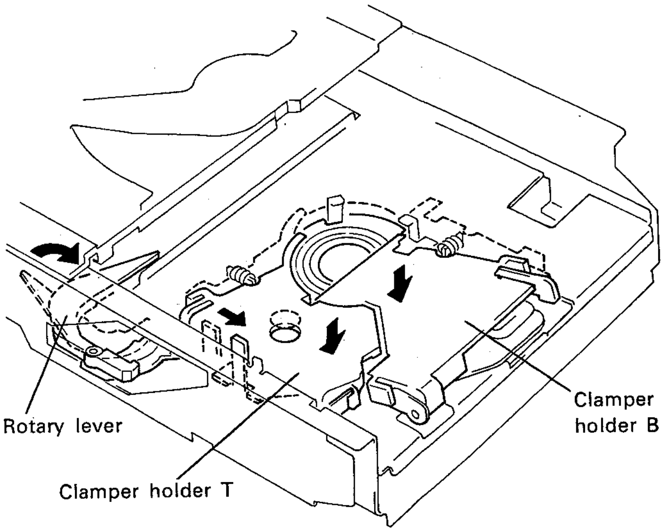

Rotary lever
Clamper holder B
Clamper holder T

Fig. 5-10

5.6 Eject operation

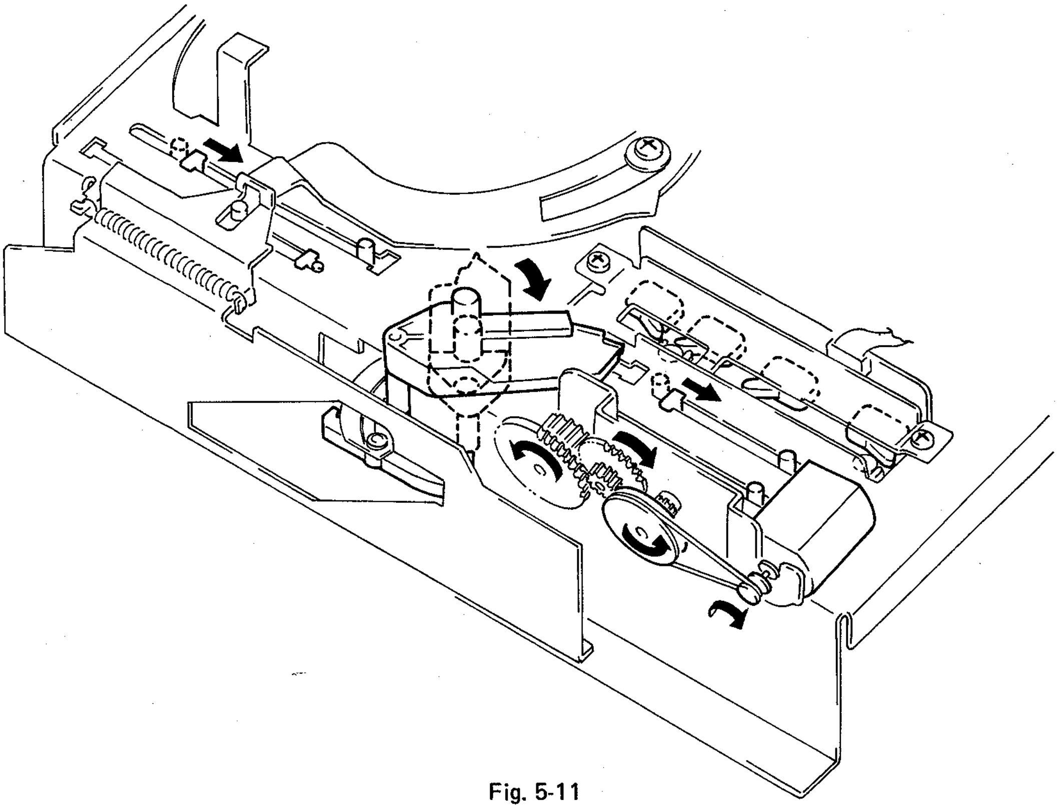


Fig. 5-11

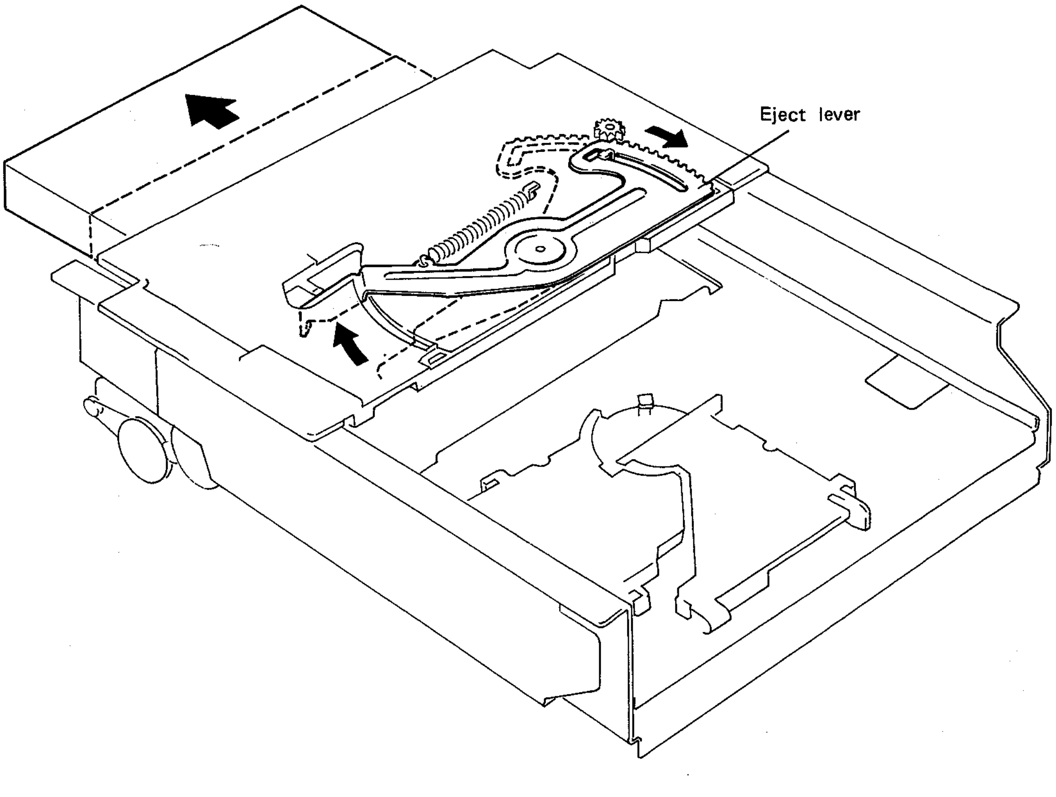

Eject lever

Fig. 5-12

6. DESCRIPTION OF OPERATIONS

This section describes the operation of the mechanisms in its procedures and flow charts in accordance with actual operations.

6.1 PLAY PROCEDURE

1. A desired disc is selected by the operation buttons.
2. The disc selector motor is switched on, and Stair (L) and Stair (R) begin moving forward and backward.
3. The servo mechanism moves up and down by actions of its subchassis's projection along with the cam grooves of Stair (L) and Stair (R) and the chassis guide groove.
4. The servo mechanism stops at the predetermined disc position.
5. The loading motor starts rotating, moving the rack backward.
6. The driving plate (locked to the rack) and driving lever move.
7. The rotary lever moves, protruding the tray from the magazine.
8. The disc moves to the concentric position on the disc holding face of the disc table.
9. As the rack moves further (At this point, the rack is released from the driving plate and locked onto the differential plate), the differential plate and clamp cam move, and clamp holders T and B move toward the disc table, thus lifts the disc. At the same time, the disc is clamped onto the disc table (this is shown as Disk Load in the flow chart in Fig. 6-2).
10. Movement of the clamp cam causes the push cam to move, raising the upper tray with disc. When the disc is loaded on the disc table, the upper tray makes a small space between the disc so that it does not affect disc rotation.
11. Starts playing.
    As the operation from the end of play to returning the disc to the magazine is simply a reverse of the loading operation, the description is omitted here.

6.2 FLOW CHART

Fig. 6-2 shows the flow chart of the disc selection operation focusing on the movement of Stair (R) and the DCNT (Q601) and DCHM (S601) signals.

① For starting of disc selection, the system control IC (IC6) performs operation of current disc select position and disc search, then depending on the results, the selector motor is rotated in either the forward or reverse direction, moving Stair (R) forward or backward, accordingly. As Stair (R) moves, the DCNT signal is sent from Q601 to IC6, counting L → H cycles, and the servo mechanism moves to the disc search.

② If the DCNT signal (Q601) is "L" at the time select operation begins (i.e. the servo mechanism is midway between 1~6 disc positions), the servo mechanism returns until the DCHM signal is changed to "H" (i.e. until it returns to the home position, Stair (R) is moved forward), then operation ① begins.

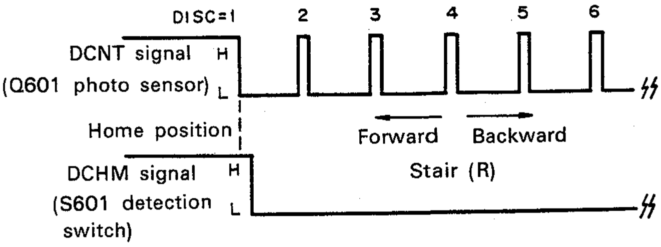
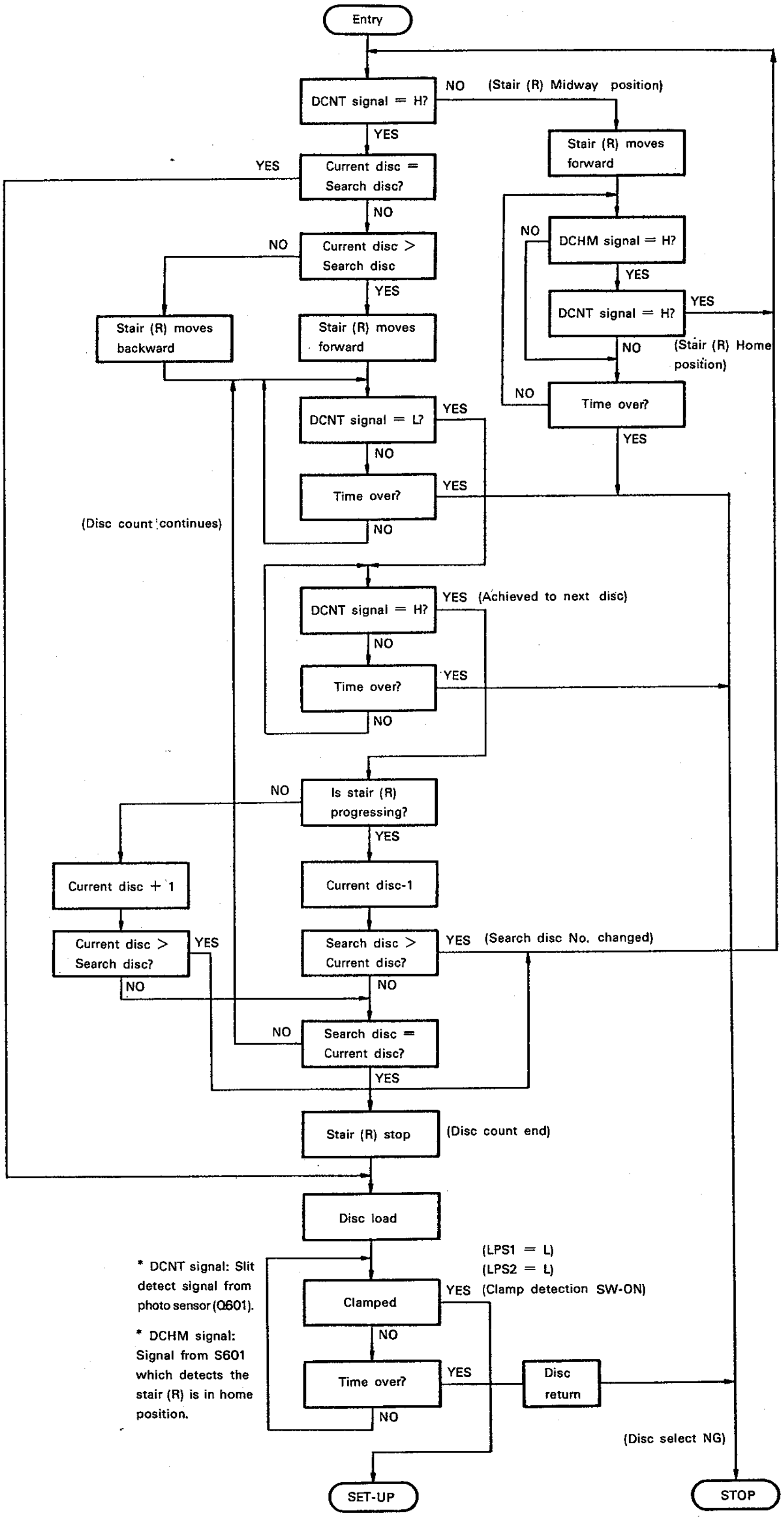


Fig. 6-1 Timing chart of Stair (R) movement

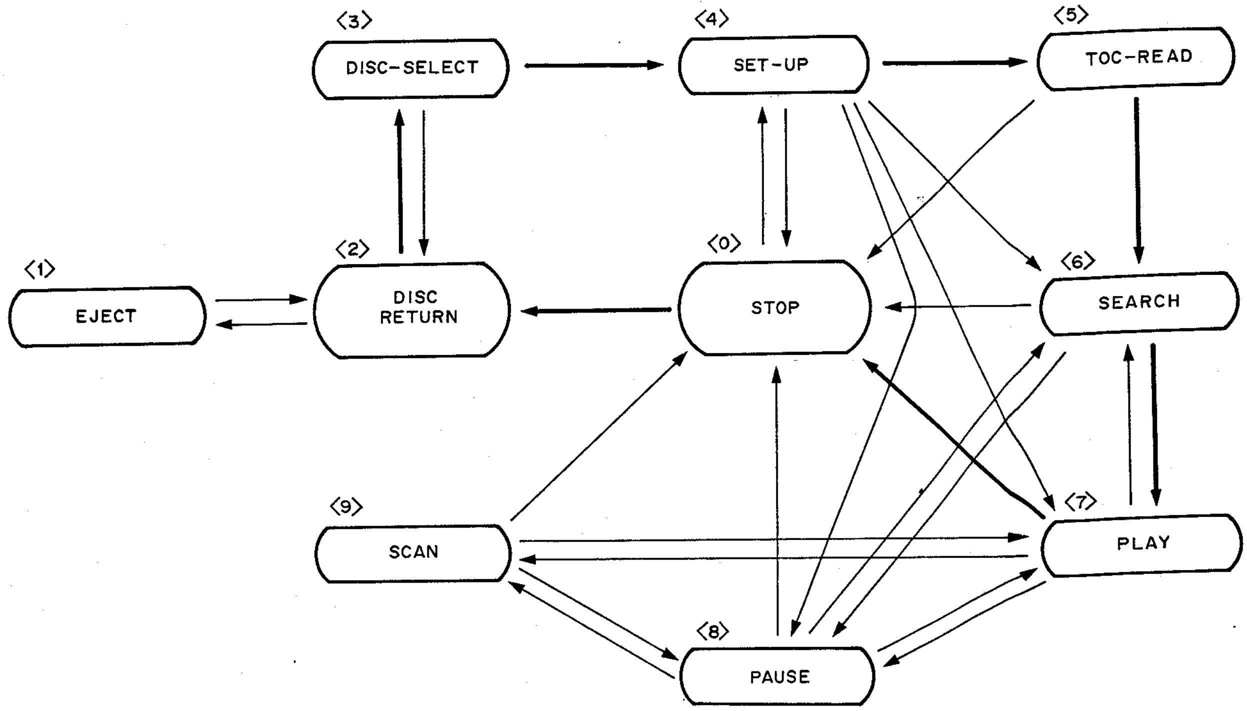

Entry
DCNT signal = H?
NO
(Stair (R) Midway position)
YES
Stair (R) moves forward
YES
Current disc = Search disc?
NO
DCHM signal = H?
NO
Current disc > Search disc
YES
YES
DCNT signal = H?
YES
Stair (R) moves backward
Stair (R) moves forward
NO
(Stair (R) Home position)
NO
Time over?
DCNT signal = L?
YES
YES
NO
Time over?
YES
(Disc count continues)
NO
DCNT signal = H?
YES (Achieved to next disc)
NO
Time over?
YES
NO
NO
Is stair (R) progressing?
YES
Current disc + 1
Current disc-1
Current disc > Search disc?
YES
Search disc > Current disc?
YES (Search disc No. changed)
NO
NO
NO
Search disc = Current disc?
YES
Stair (R) stop
(Disc count end)
Disc load
(LPS1 = L)
(LPS2 = L)
Clamped
YES (Clamp detection SW-ON)
NO
Time over?
YES
Disc return
NO
(Disc select NG)
SET-UP
STOP

* DCNT signal: Slit detect signal from photo sensor (Q601).

* DCHM signal: Signal from S601 which detects the stair (R) is in home position.

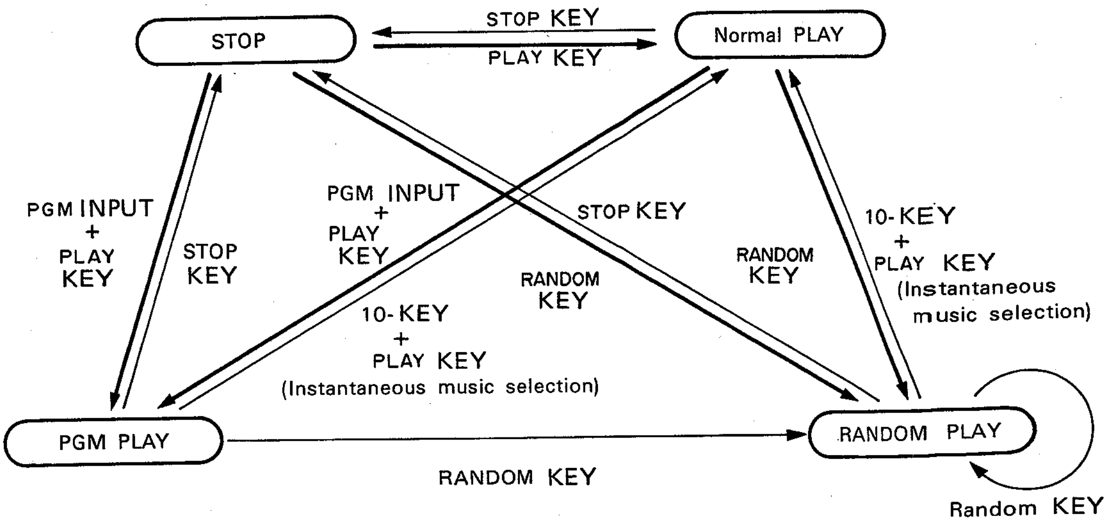
Fig. 6-2 Flow chart

Multi-CD-Player Mode Transition Diagram



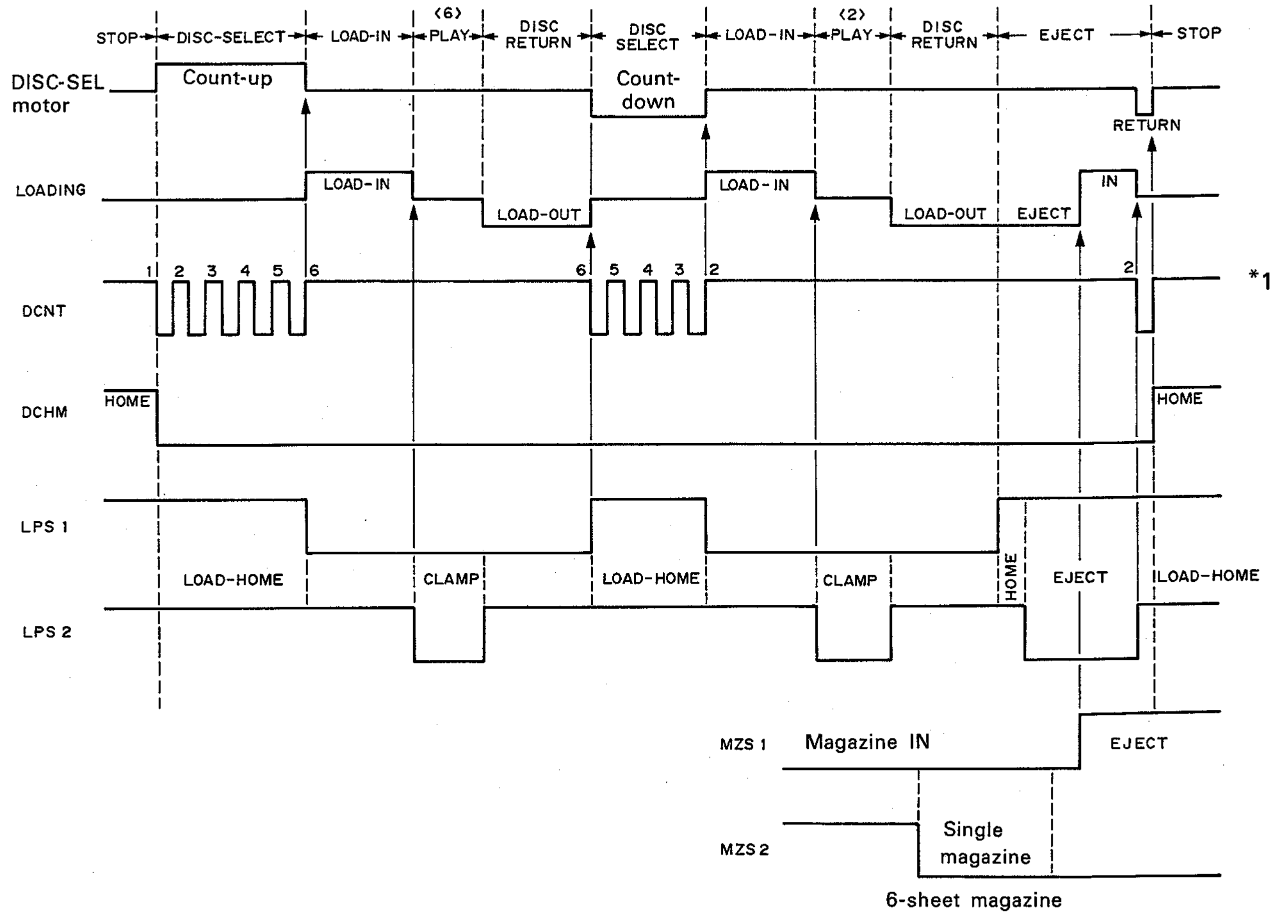
<3> DISC-SELECT
<4> SET-UP
<5> TOC-READ
<1> EJECT
<2> DISC RETURN
<0> STOP
<6> SEARCH
<9> SCAN
<7> PLAY
<8> PAUSE

Multi-CD-Player Play Mode Transition Diagram



STOP
Normal PLAY
STOP KEY
PLAY KEY
PGM INPUT + PLAY KEY
STOP KEY
PGM INPUT + PLAY KEY
STOP KEY
RANDOM KEY
RANDOM KEY
10-KEY + PLAY KEY (Instantaneous music selection)
10-KEY + PLAY KEY (Instantaneous music selection)
PGM PLAY
RANDOM PLAY
RANDOM KEY
Random KEY

DISC-SELECT/RETURN/EJECT Operation Chart

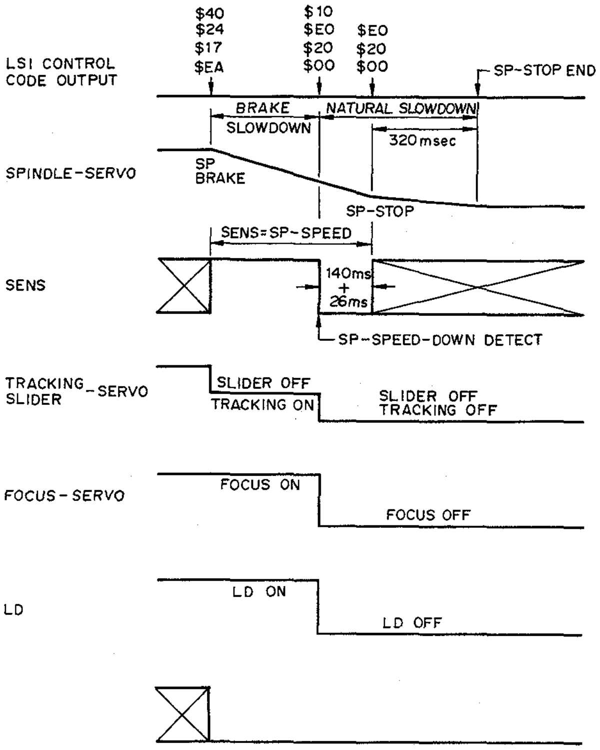

STOP
DISC-SELECT
LOAD-IN
⟨6⟩ PLAY
DISC RETURN
DISC SELECT
LOAD-IN
⟨2⟩ PLAY
DISC RETURN
EJECT
STOP
DISC-SEL motor
Count-up
Count-down
RETURN
LOADING
LOAD-IN
LOAD-OUT
LOAD-IN
LOAD-OUT
EJECT
IN
DCNT
1 2 3 4 5 6
6 5 4 3 2
2
*1
DCHM
HOME
HOME
LPS 1
LPS 2
LOAD-HOME
CLAMP
LOAD-HOME
CLAMP
HOME
EJECT
LOAD-HOME
MZS 1
Magazine IN
EJECT
MZS 2
Single magazine
6-sheet magazine

Note: MZS2 has no correlation with signals LPS1 and LPS2.

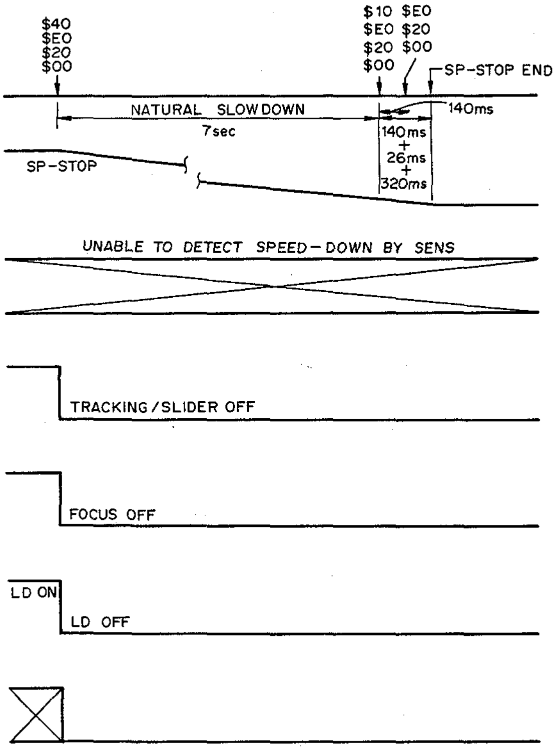
*1 : When starting count, if it is DCNT=L, recount by returning to HOME.

STOP Mode Timing Chart

(1) Normal stop (During GFS locking)

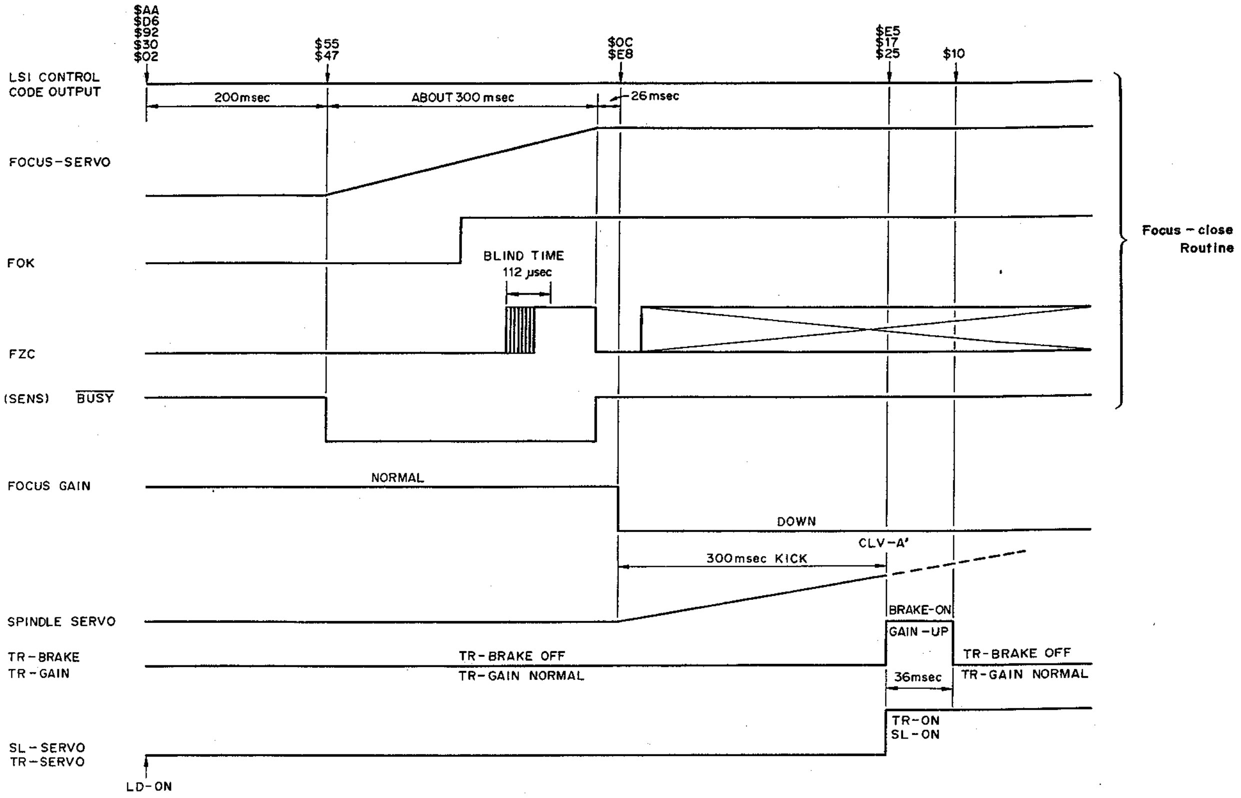

$40
$24
$17
$EA
$10
$E0
$20
$00
$E0
$20
$00
LSI CONTROL CODE OUTPUT
SP-STOP END
BRAKE SLOWDOWN
NATURAL SLOWDOWN
320msec
SPINDLE-SERVO
SP BRAKE
SP-STOP
SENS=SP-SPEED
SENS
140ms + 26ms
SP-SPEED-DOWN DETECT
TRACKING SLIDER -SERVO
SLIDER OFF
TRACKING ON
SLIDER OFF
TRACKING OFF
FOCUS-SERVO
FOCUS ON
FOCUS OFF
LD
LD ON
LD OFF

(2) Abnormal stop (GFS-NG or FOCUS deviation)

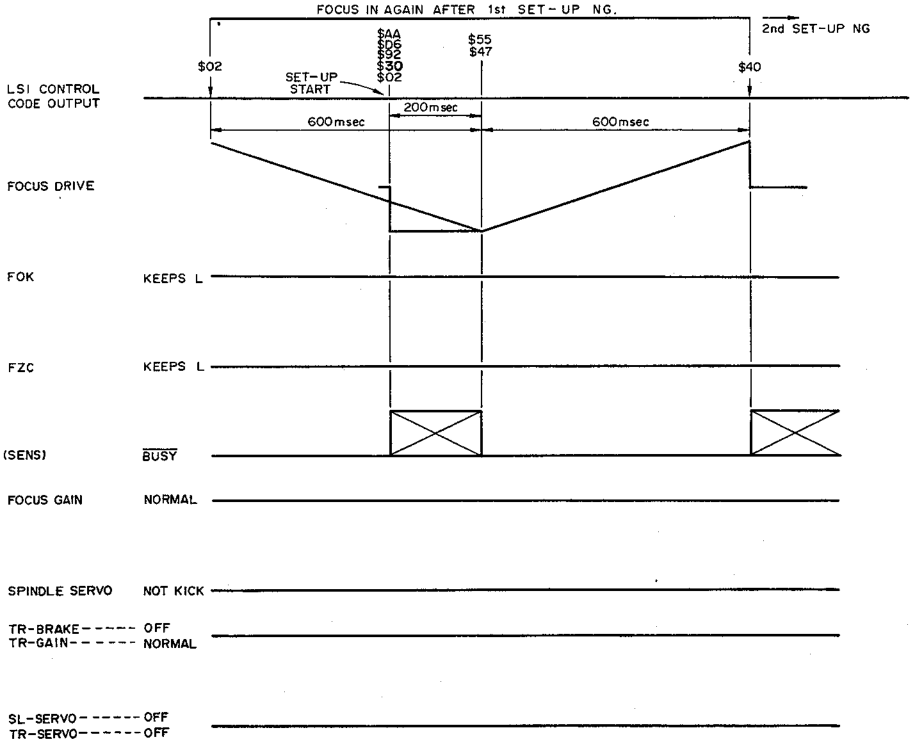

$40
$E0
$20
$00
$10
$E0
$20
$00
$E0
$20
$00
SP-STOP END
NATURAL SLOWDOWN
7sec
140ms
140ms + 26ms + 320ms
SP-STOP
UNABLE TO DETECT SPEED-DOWN BY SENS
TRACKING/SLIDER OFF
FOCUS OFF
LD ON
LD OFF

(Notes)
- Refer to FLOW CHART and PROGRAM DESCRIPTION.
- H/L in this timing chart are only for convenience sake, not the actual port's output etc.

SET-UP Mode Timing Chart

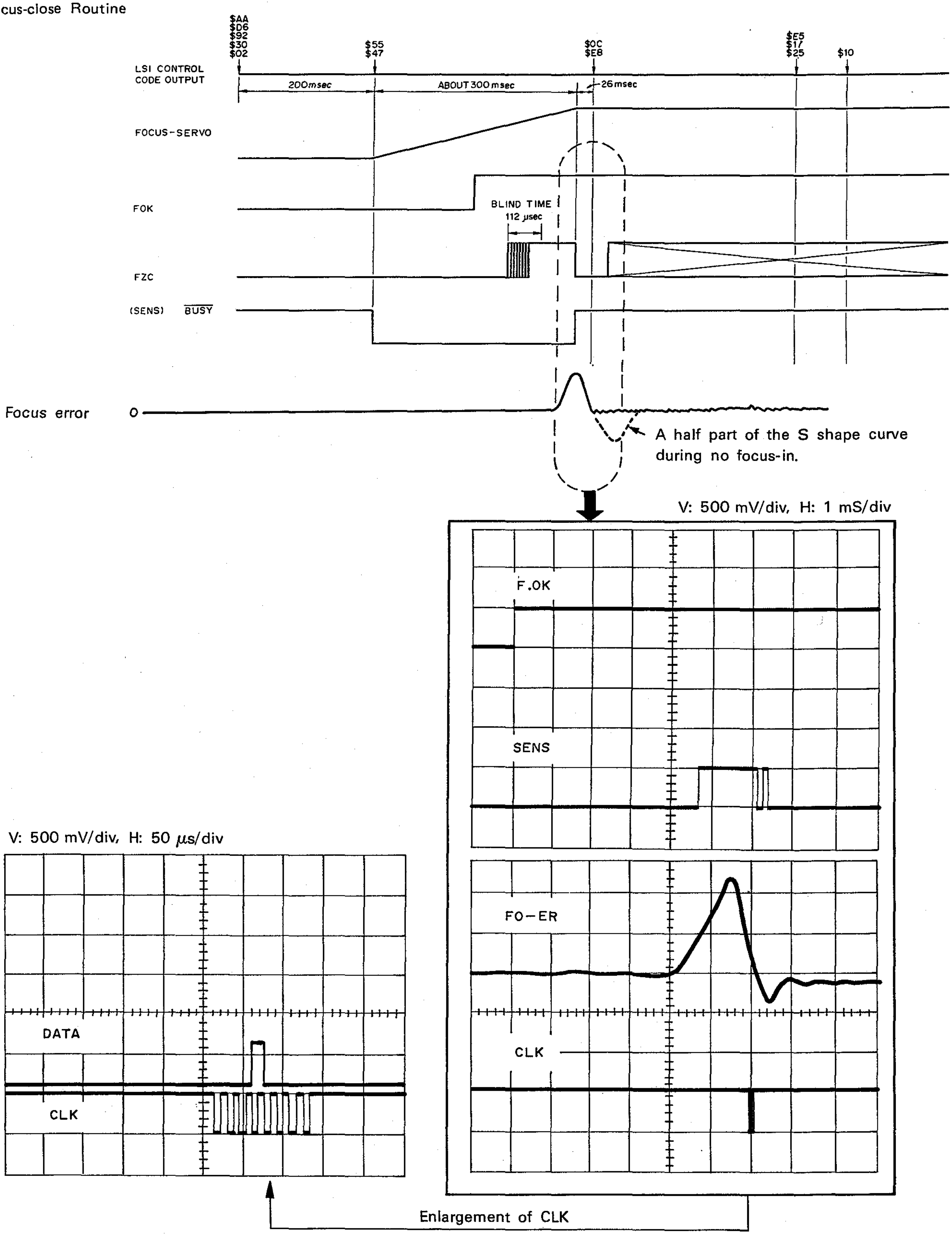

$AA
$D6
$92
$30
$02
$55
$47
$0C
$E8
$E5
$17
$25
$10
LSI CONTROL CODE OUTPUT
200msec
ABOUT 300 msec
26msec
FOCUS-SERVO
FOK
BLIND TIME
112 µsec
FZC
(SENS) BUSY
Focus – close Routine
FOCUS GAIN
NORMAL
DOWN
CLV-A'
300msec KICK
SPINDLE SERVO
BRAKE-ON
GAIN-UP
TR-BRAKE
TR-GAIN
TR-BRAKE OFF
TR-GAIN NORMAL
36msec
TR-BRAKE OFF
TR-GAIN NORMAL
TR-ON
SL-ON
SL-SERVO
TR-SERVO
LD-ON

SET-UP TIMING CHART (IN CASE OF N.G)


FOCUS IN AGAIN AFTER 1st SET-UP NG.
2nd SET-UP NG
$02
SET-UP START
$AA
$D6
$92
$30
$02
$55
$47
$40
LSI CONTROL CODE OUTPUT
600msec
200msec
600msec
FOCUS DRIVE
FOK
KEEPS L
FZC
KEEPS L
(SENS)
BUSY
FOCUS GAIN
NORMAL
SPINDLE SERVO
NOT KICK
TR-BRAKE------ OFF
TR-GAIN------- NORMAL
SL-SERVO------- OFF
TR-SERVO------- OFF

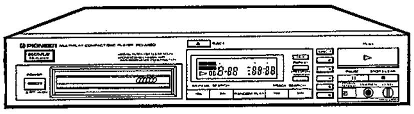
(Notes)
- Refer to FLOW CHART and PROGRAM DESCRIPTION.
- H/L in this timing chart are only for convenience sake, not the actual port's output etc.

Focus-close Routine


$AA
$D6
$92
$30
$02
$55
$47
$0C
$E8
$E5
$1/
$25
$10
LSI CONTROL CODE OUTPUT
200msec
ABOUT 300 msec
26msec
FOCUS-SERVO
FOK
BLIND TIME
112 µsec
FZC
(SENS) BUSY
Focus error
0
A half part of the S shape curve during no focus-in.
V: 500 mV/div, H: 1 mS/div
F.OK
SENS
FO-ER
CLK
V: 500 mV/div, H: 50 µs/div
DATA
CLK
Enlargement of CLK

Service Manual

[redacted]



ORDER NO.
ARP1342

MULTI-PLAY COMPACT DISC PLAYER

PD-M50
PD-M40
PD-M40-S

MODEL PD-M50, PD-M40 AND PD-M40-S COMES IN SEVEN VERSIONS DISTINGUISHED AS FOLLOWS:

Type	Applicable model			Power requirement	Export destination
	PD-M50	PD-M40	PD-M40-S		
KU	○	○	—	AC120V only	U.S.A
KC	○	○	—	AC120V only	Canada
HEM	○	○	○	AC220V, 240V (switchable)*	Eouropian continent
HB	○	—	—	AC220V, 240V (switchable)*	United kingdom
HP	—	○	—	AC220V, 240V (switchable)*	Australia
SD	○	○	—	AC110V, 120-127V, 220V, 240V (switchable)	General market
SD/G	○	—	—	AC110V, 120-127V, 220V, 240V (switchable)	U.S.Military

* Change the primary wiring, please refer to pages 77 or 81.

- **This service manual is applicable to the PD-M50/KU, KC, HEM, HB, SD, SD/G, PD-M40 and PD-M40-S types.**
- **As to the PD-M50/KC, HEM, HB, SD and SD/G types, please refer to pages 76.**
- **As to the PD-M40/KU, KC, HEM, HP, SD and PD-M40-S/HEM types, please refer to pages 78.**
- **Ce manuel d'instruction se refère au mode de réglage, en français.**
- **Este manual de servicio trata del método ajuste escrito en español.**

PIONEER ELECTRONIC CORPORATION 4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153, Japan
PIONEER ELECTRONICS SERVICE INC. P.O. Box 1760, Long Beach, California 90801 U.S.A.
PIONEER ELECTRONICS OF CANADA, INC. 505 Cochrane Drive, Markham, Ontario L3R 6B8 Canada TEL: [416] 479-4411
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A725

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1. SAFETY INFORMATION

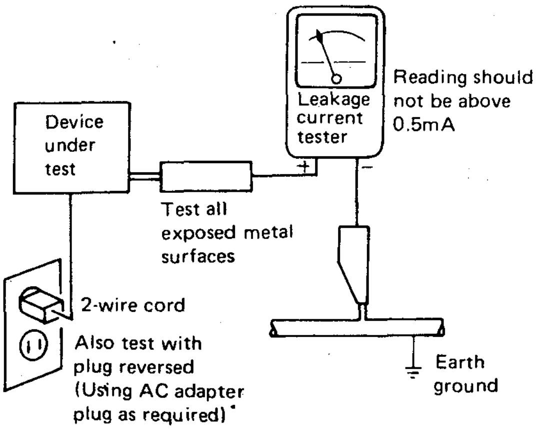
(FOR USA MODEL ONLY)

1. SAFETY PRECAUTIONS

The following check should be performed for the continued protection of the customer and service technician.

LEAKAGE CURRENT CHECK

Measure leakage current to a known earth ground (water pipe, conduit, etc.) by connecting a leakage current tester such as Simpson Model 229-2 or equivalent between the earth ground and all exposed metal parts of the appliance (input/output terminals, screwheads, metal overlays, control shaft, etc.). Plug the AC line cord of the appliance directly into a 120V AC 60Hz outlet and turn the AC power switch on. Any current measured must not exceed 0.5mA.



Leakage current tester
Reading should not be above 0.5mA
Device under test
+
−
Test all exposed metal surfaces
2-wire cord
Also test with plug reversed (Using AC adapter plug as required)
Earth ground

AC Leakage Test

ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE ARE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

2. PRODUCT SAFETY NOTICE

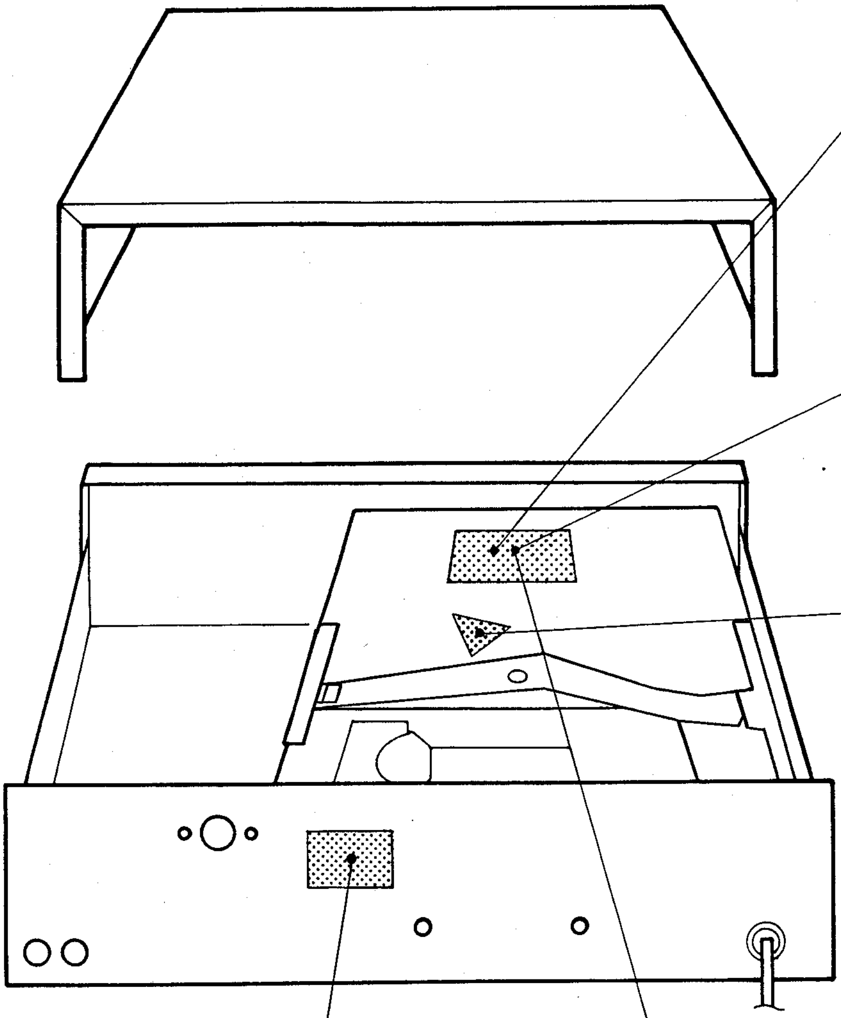
Many electrical and mechanical parts in the appliance have special safety related characteristics. These are often not evident from visual inspection nor the protection afforded by them necessarily can be obtained by using replacement components rated for voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual.

Electrical components having such features are identified by marking with a ⚠ on the schematics and on the parts list in this Service Manual.

The use of a substitute replacement component which does not have the same safety characteristics as the PIONEER recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, or other hazards.

Product safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current PIONEER Service Manual. A subscription to, or additional copies of, the PIONEER Service Manual may be obtained at a nominal charge from PIONEER.

LABEL CHECK



KC model

CAUTION
HAZARDOUS LASER
AND ELECTROMAGNETIC
RADIATION WHEN
OPEN AND INTERLOCK
DEFEATED

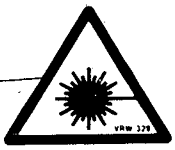
ATTENTION
RAYONNEMENT LASER ET
ELECTROMAGNETIQUE
DANGEREUX SI OUVERT
AVEC L'ENCLENCHEMENT
DE SECURITE ANNULE

VRW-316

HEM model

CAUTION
LASER RADIATION WHEN OPEN, AVOID EXPOSURE TO BEAM
ADVARSEL
FARE FOR USYNLIG LASERSTRÅLING VED ÅBNING AF DÆKSEL.
UNDGÅ AT UDSÆTTE ØJNENE FOR STRÅLING.
VORSICHT!
UNSICHTBARE LASER-STRAHLUNG TRITT AUS, WENN DECKEL
(ODER KLAPPE) GEÖFFNET IST! NICHT DEM STRAHL AUSSETZEN!
PRW-175

HEM, HB and HP models



HEM, HB and HP models

CLASS 1
LASER PRODUCT
VRW-328

HB and HP models

CAUTION
INVISIBLE LASER
RADIATION WHEN OPEN,
AVOID EXPOSURE
TO BEAM
PRW1018

Additional Laser Caution

1. ON/OFF (L/H) MODE OF THE LOADING STATE DETECTION SWITCHES, LPS1 (S701) AND LPS2 (S702), ARE DETECTED WITH THE SYSTEM MICROCOMPUTER. LASER DIODE DOESN'T OSCILLATES UNLESS THESE SWITCHES ARE BOTH ON (L), THAT IS CLAMPED STATE. CONSEQUENTLY, IF THESE SWITCHES ARE SHORT-CIRCUITED ON PURPOSE, THE INTERLOCK IS INVALID. WHEN PINS ④, ⑤ OR ㉙ OF CXA1081S (IC1) IS SHORT-CIRCUITED TO GND, OR BETWEEN RESPECTIVE PINS OF Q1 ARE SHORT-CIRCUITED (FAULT CONDITION), THE LASER DIODE KEEPS OSCILLATING.
   IN TEST MODE (REFER TO PAGE 42.), THE INTERLOCK MECHANIZM DOESN'T OPERATE.
2. AT THE STATE WHICH BONNET IS OPENED, SERVO MECHANISM IS REMOVED AND IT IS TURNED OVER, IF IT IS FAULT CONDITION AND TEST MODE AS DESCRIBED IN ITEM 1, THERE IS THE DANGER TO BE CAUGHT LASER BEAM MORE THAN CLASS 1.

2. SPECIFICATIONS

1. General

Type	Compact disc digital audio system
Usable discs	Compact Disc
Signal format	Sampling frequency: 44.1 kHz Sampling bit number: 16 bit linear
Power requirements	
European models	AC 220 V, 50/60 Hz
U.K., Australian models	AC 240 V, 50/60 Hz
U.S., Canadian models	AC 120 V, 60 Hz
Other models	AC 110/120 - 127/220/240 V (switchable) 50/60 Hz
Power consumption	
European, U.K., Australian, U.S., Canadian models	15 W
Other models	15 W
Operating temperature	+5 °C — +35 °C
Weight	4.9 kg (10 lb 13 oz)
External dimensions	420(W) x 315(D) x 80(H) mm 16-9/16(W) x 12-13/32(D) x 3-5/32(H) in

2. Audio section

Frequency response	4 Hz - 20 kHz (±0.5 dB)(EIAJ)
S/N ratio	more than 95 dB (EIAJ)
Dynamic range	more than 93 dB (EIAJ)
Harmonic distortion	less than 0.005 % (EIAJ)
Output voltage	2.0 V ±0.5 V (EIAJ)
Wow and flutter	less than (±0.001 %W.PEAK) (below measurable level)(EIAJ)
Channels	2-channel (stereo)

3. Output Terminal

Audio line output
Headphone jack (with volume control)

4. Functions

Number of discs to be stored — maximum 6.

Basic operation keys

- PLAY, PAUSE, STOP

Search function

- Disc selection (6 keys)
- Track selection (10 keys)(remote control unit only)
- Manual search
- Track search

Programming

- Maximum 32 steps
- Pause
- Direct programming
- Program clear

Repeat functions

- All discs repeat
- Program repeat
- 1 disc repeat (with program)
- Track repeat (with program)

Random Play

- Random play

Switching display

- Time consumed, remaining time, and TOTAL time

5. Display

FL tube display

- Passing time display (min, sec)
- Remaining time display
- Total time display
- Disc number, track number
- Program step number
- Program indicator
- Repeat indicator
- Random play indicator
- Play indicator
- Pause indicator

6. Accessories

● Remote control unit	1
● AAA/R03 dry batteries	2
● Six-compact-disc magazine	1
● Single-compact-disc magazine (except for European and U.K. models)	1
● Output cable	1
● Operating instructions	1

NOTE:
Specifications and design subject to possible modification without notice, due to improvements.

3. PANEL FACILITIES

POWER switch

Press to turn power to the unit ON and OFF.

EJECT key

Press to eject a magazine or the disc tray. When pressed, any magazine (in case of single magazine, the disc tray) inside is expelled forward.

Magazine insertion slot

PLAY key

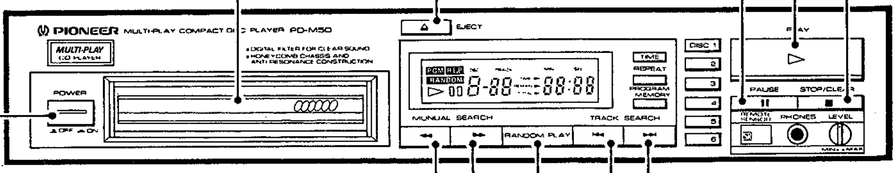
Press to begin playback, and to release the player from the pause mode.

PAUSE key

Press to temporarily interrupt playback. When pressed again, the player is released from the pause mode.

STOP/CLEAR key

Press to stop playback. When pressed, the player goes into stop mode and all operations stop.
Press to clear a program. When pressed during stop mode, the program stored in memory is cleared.



MANUAL SEARCH keys

When the player is in play or pause modes, these keys are pressed to perform fast forward or fast backward operations, to allow manual searching.
These operations are done only during the time either key is pressed.

[►►] : Fast forward operation (If fast forward operation is performed to the end of the disc, "End" will be indicated and the player will enter the pause mode.)

[◄◄] : Fast backward operation (If fast backward operation is performed to the beginning of the disc, the player will enter play mode.)

If these operations are performed during programmed play mode, the player will enter the pause mode (or play mode), just before transferring to the next (or previous) step.

RANDOM PLAY key

Press to begin random playback.

TRACK SEARCH keys

When the player is in the normal play, programmed play or pause modes, these keys are pressed to search for a desired track. The player can advance to the beginning of the next track on the disc or program or back track to the beginning of the current or previous track.

[►►|] : When pressed once, play restarts at the beginning of the next track on the disc; when pressed continuously, the disc playback shifts to the beginning of succeeding tracks on the disc. (During programmed playback, it moves to the beginning of the next programmed track.)

[|◄◄] : When pressed once, the disc playback returns to the beginning of the currently playing track; when pressed continuously, the disc playback shifts to the beginning of previous tracks on the disc. (During programmed playback it returns to the beginning of the previously programmed track.)

INDICATORS

PGM : Lights after programming (after program has been memorized).

RANDOM : Lights during random playing.

REP : Lights during repeat play.

DISC : Indicates disc number (1 - 6) during play or search.

TRACK : Indicates track number (01 - 99) during play or search.

TIME/REMAIN/TOTAL

Press TIME key for switching.

TIME: Indicates playing time (min/sec)

REMAIN: Indicates the time remaining on the track being played.

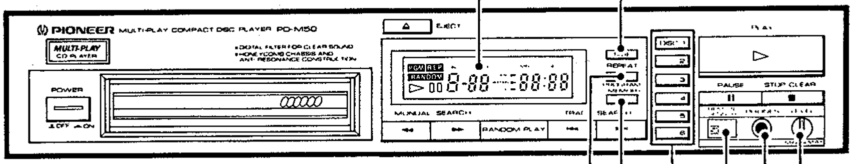
TOTAL: Indicates total playing time (min/sec).
When programming, the total number of steps is indicated.

MIN: Playing or remaining time for the track indicated by the minute.

SEC: Playing or remaining time for the track indicated by the second.

PLAY (▷) : Lights during playback.

PAUSE (▯▯) : Lights during pause mode, when playback is temporarily interrupted.


PIONEER MULTI-PLAY COMPACT DISC PLAYER PD-M50
MULTI-PLAY CD PLAYER
•DIGITAL FILTER FOR CLEAR SOUND
•HONEYCOMB CHASSIS AND ANTI-RESONANCE CONSTRUCTION
POWER
OFF ON
EJECT
PGM REP
RANDOM
MANUAL SEARCH
RANDOM PLAY
TRACK SEARCH
REPEAT
DISC 1
2
3
4
5
6
PLAY
PAUSE
STOP CLEAR

TIME key

- Use to select the method for displaying the playing time on the indicator panel.
  Each time the key is pressed, the indication changes from TIME, and REMAIN (track remain) to TOTAL in that order. (For details concerning the display contents, refer to the explanation about the indicators.)

REPEAT key

Press to perform repeat playback.

- If pressed during normal playback mode, all tracks on the inserted disc will be played back repeatedly.
- If pressed during programmed playback, the programmed tracks will be repeatedly played back in the programmed order.
- In the case of random play mode, after all the tracks have been played, random play will start again.

REMOTE SENSOR window

DISC NO. keys (DISC NUMBER 1 - 6)

Use to select disc numbers for playback or programming.

PGM MEMORY key (PROGRAM MEMORY)

Use to program a sequence of tracks.

- Press this key after selecting a desired disc and track with disc and TRACK SEARCH keys. Tunes will be added to the program in the order in which they are specified.
- If only a DISC NO. key is pressed, all tracks on the specified disc will be added to the program. The letters AL will appear on the indicator.

PHONES (headphones) jack

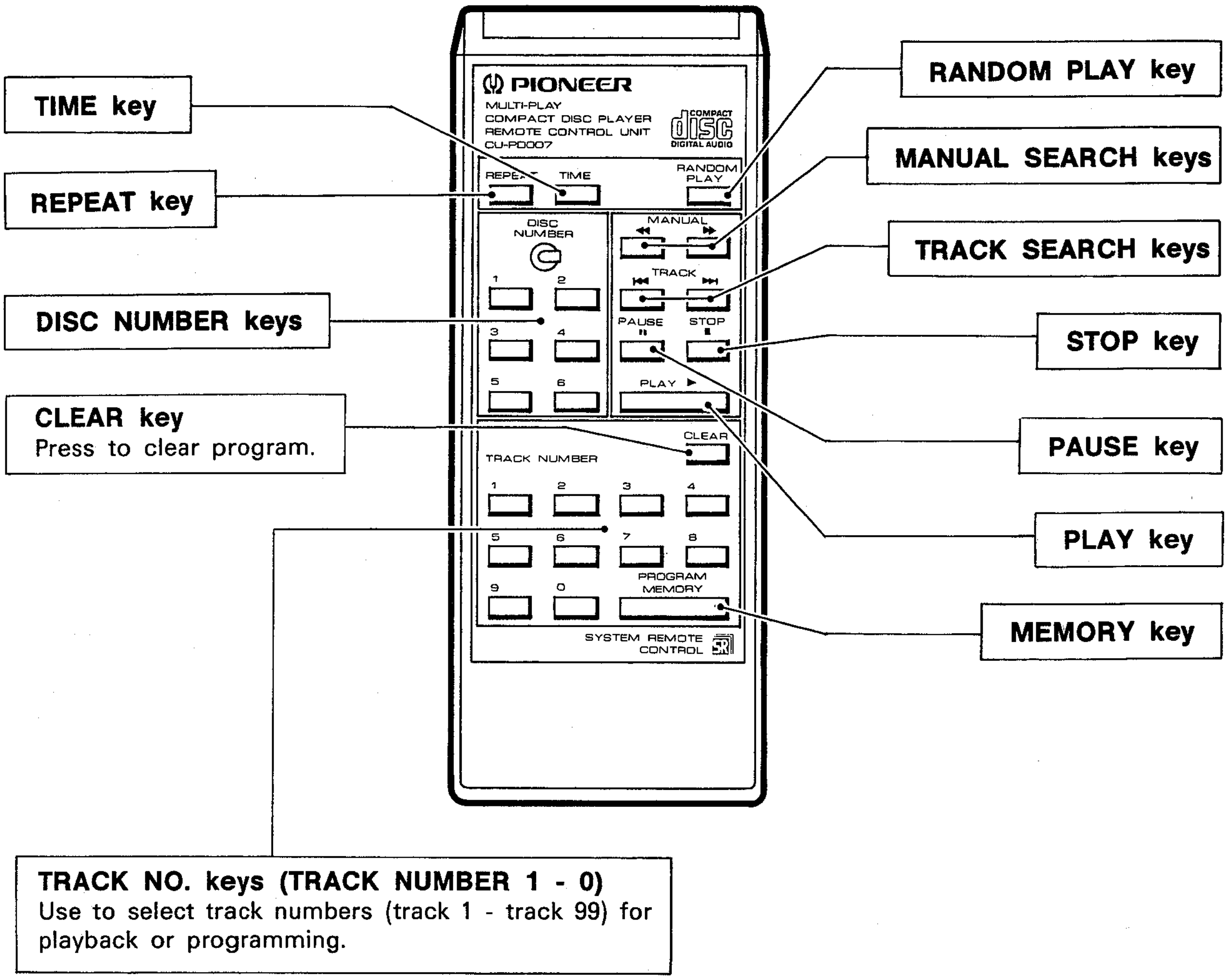
When you wish to use headphones, insert the plug for the headphones into the headphones jack.

PHONES LEVEL control knob

Use to adjust the level of sound when using headphones. Turning the knob to the right increases the sound level.

REMOTE CONTROL UNIT

Refer to the player front panel section for information regarding other key functions not specified here.


PIONEER
MULTI-PLAY
COMPACT DISC PLAYER
REMOTE CONTROL UNIT
CU-PD007
COMPACT disc DIGITAL AUDIO
REPEAT
TIME
RANDOM PLAY
DISC NUMBER
1
2
3
4
5
6
MANUAL
TRACK
PAUSE
STOP
PLAY
CLEAR
TRACK NUMBER
1
2
3
4
5
6
7
8
9
0
PROGRAM MEMORY
SYSTEM REMOTE CONTROL
SR

TIME key

REPEAT key

DISC NUMBER keys

CLEAR key
Press to clear program.

RANDOM PLAY key

MANUAL SEARCH keys

TRACK SEARCH keys

STOP key

PAUSE key

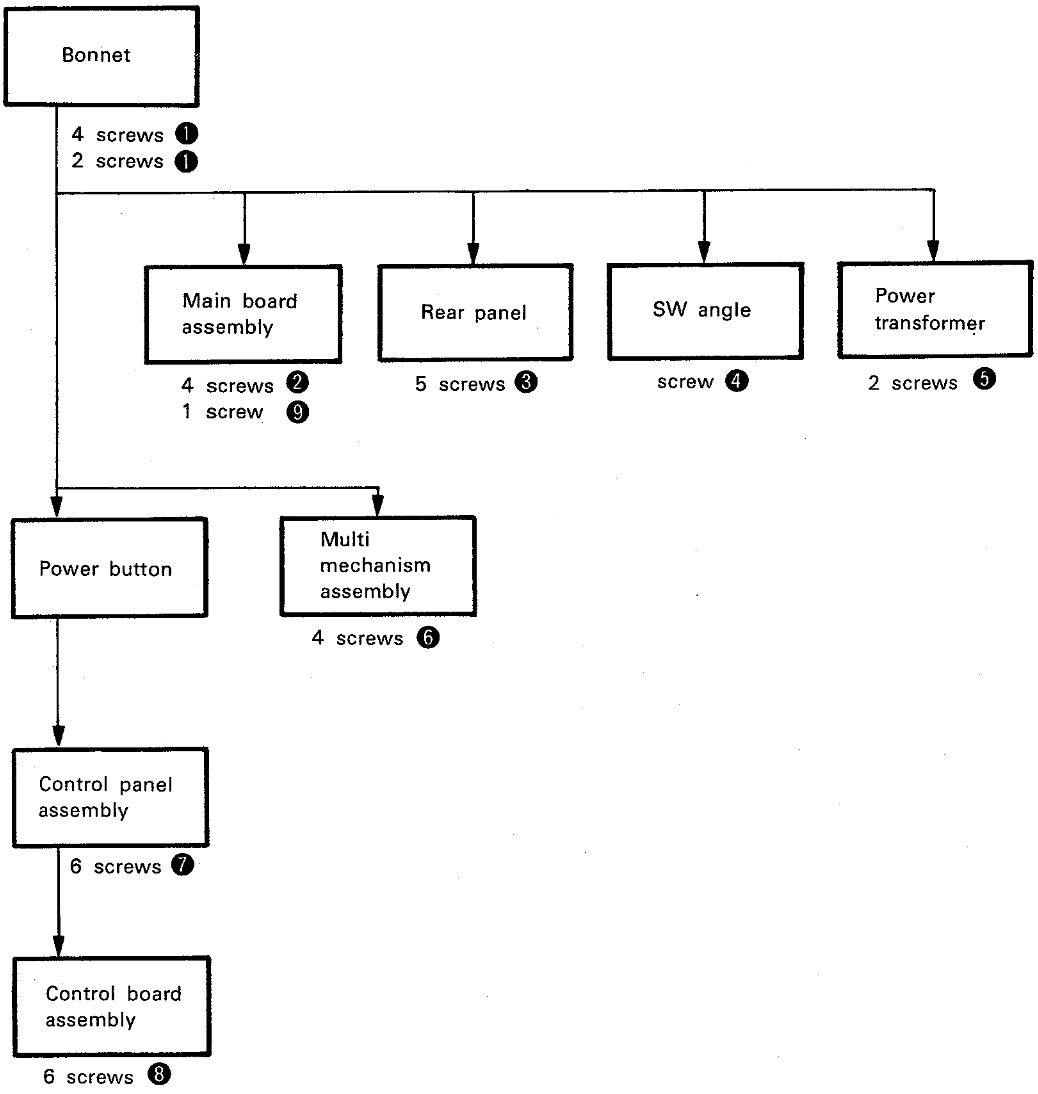
PLAY key

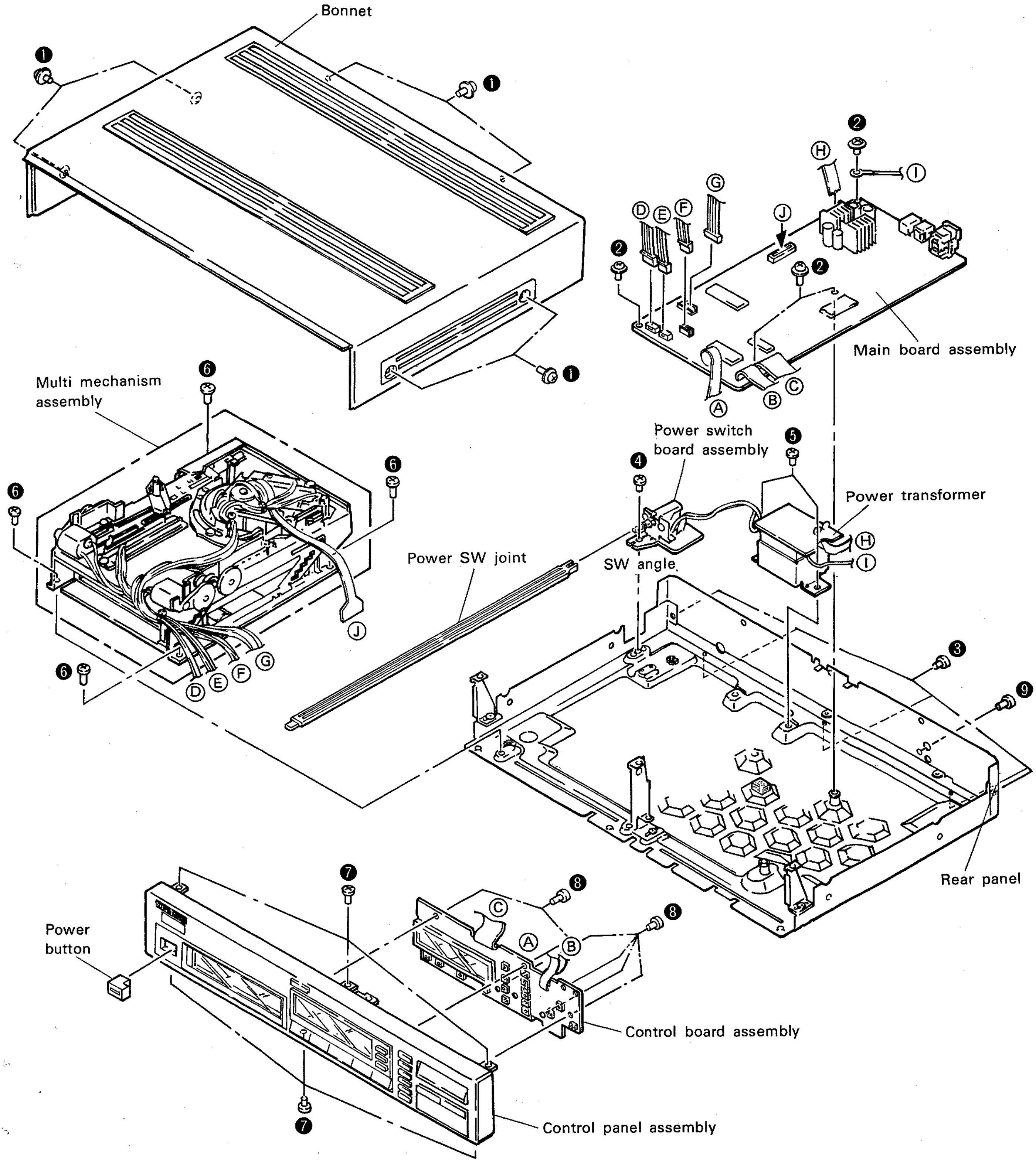
MEMORY key

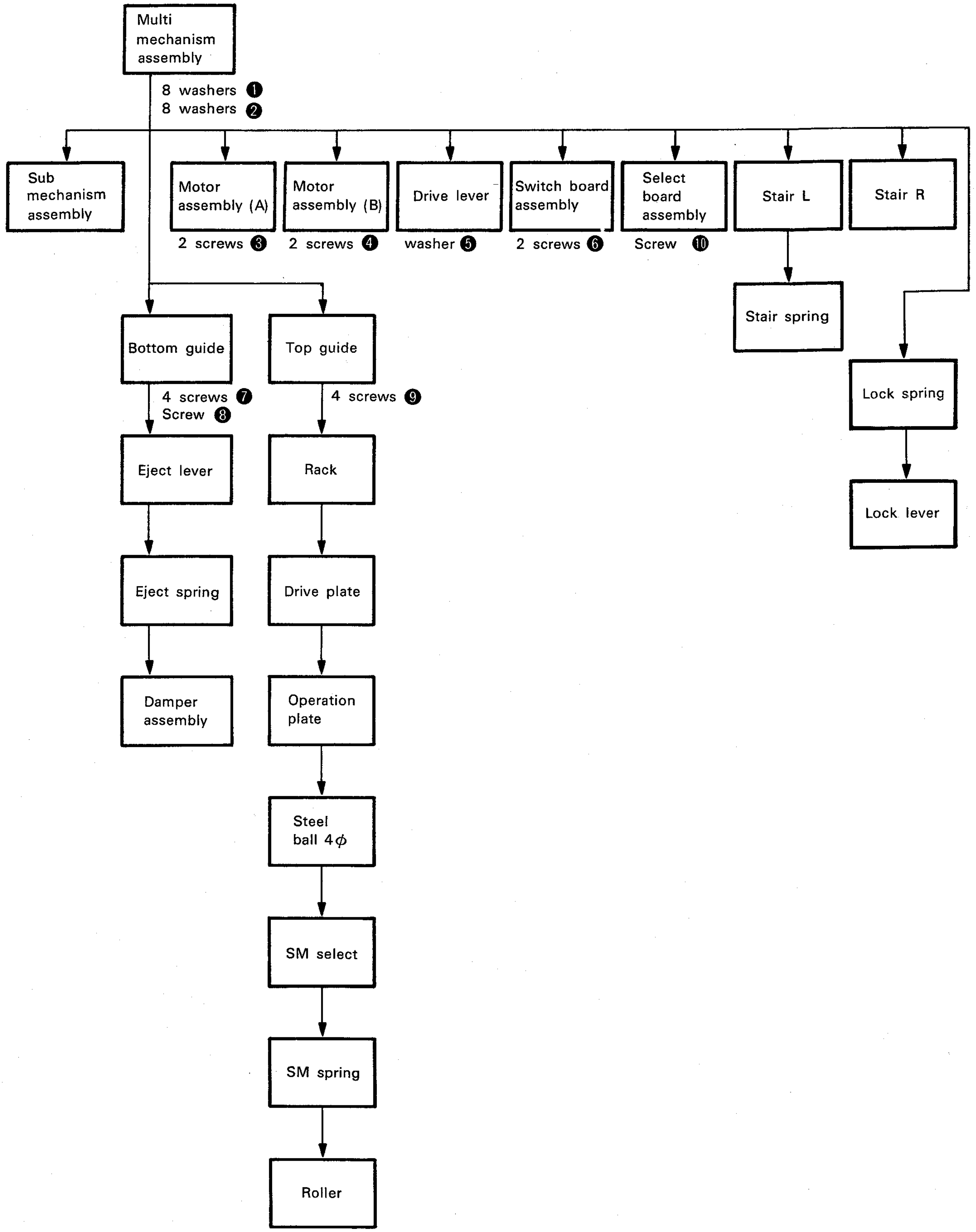
TRACK NO. keys (TRACK NUMBER 1 - 0)
Use to select track numbers (track 1 - track 99) for playback or programming.

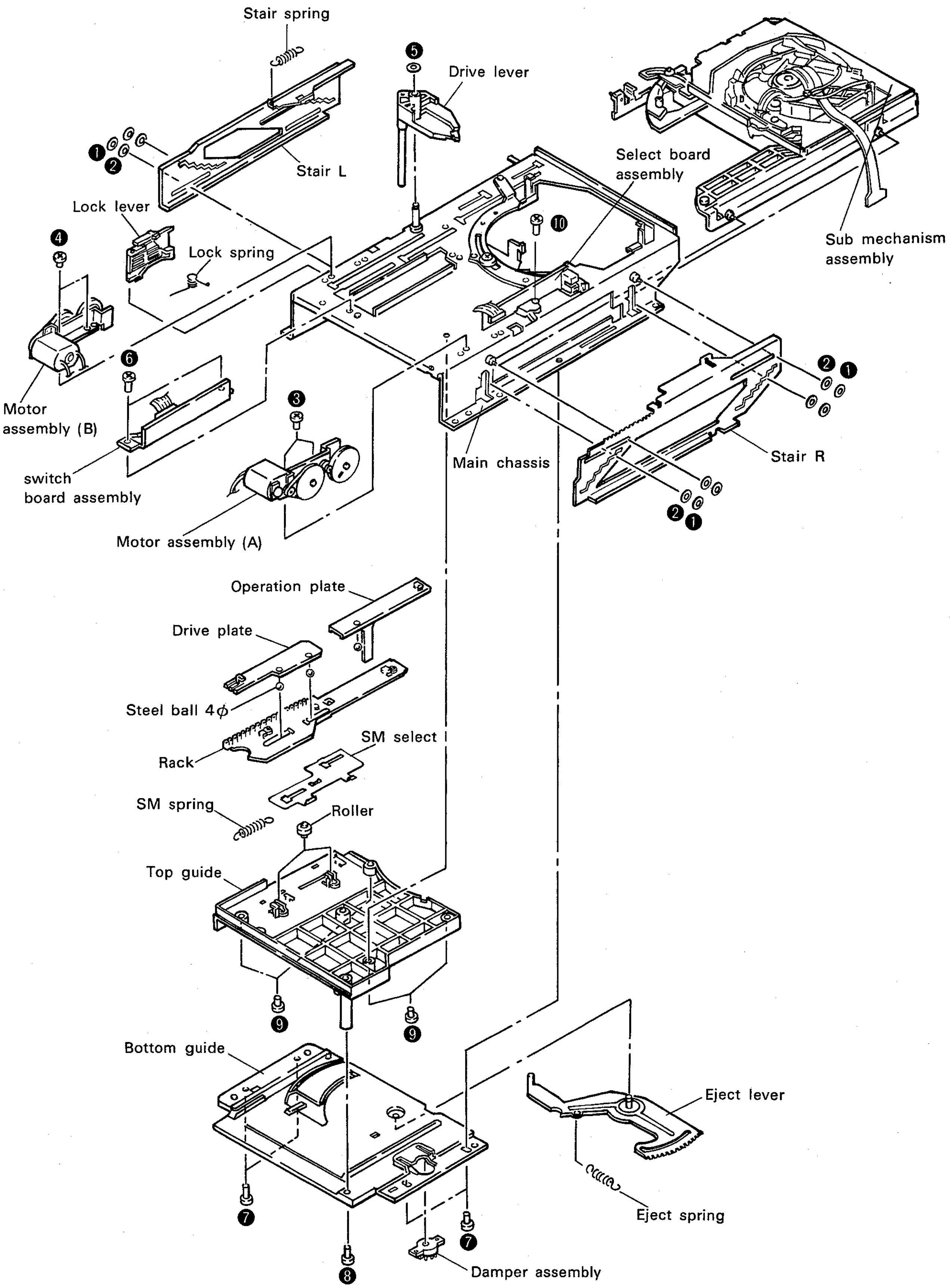
6

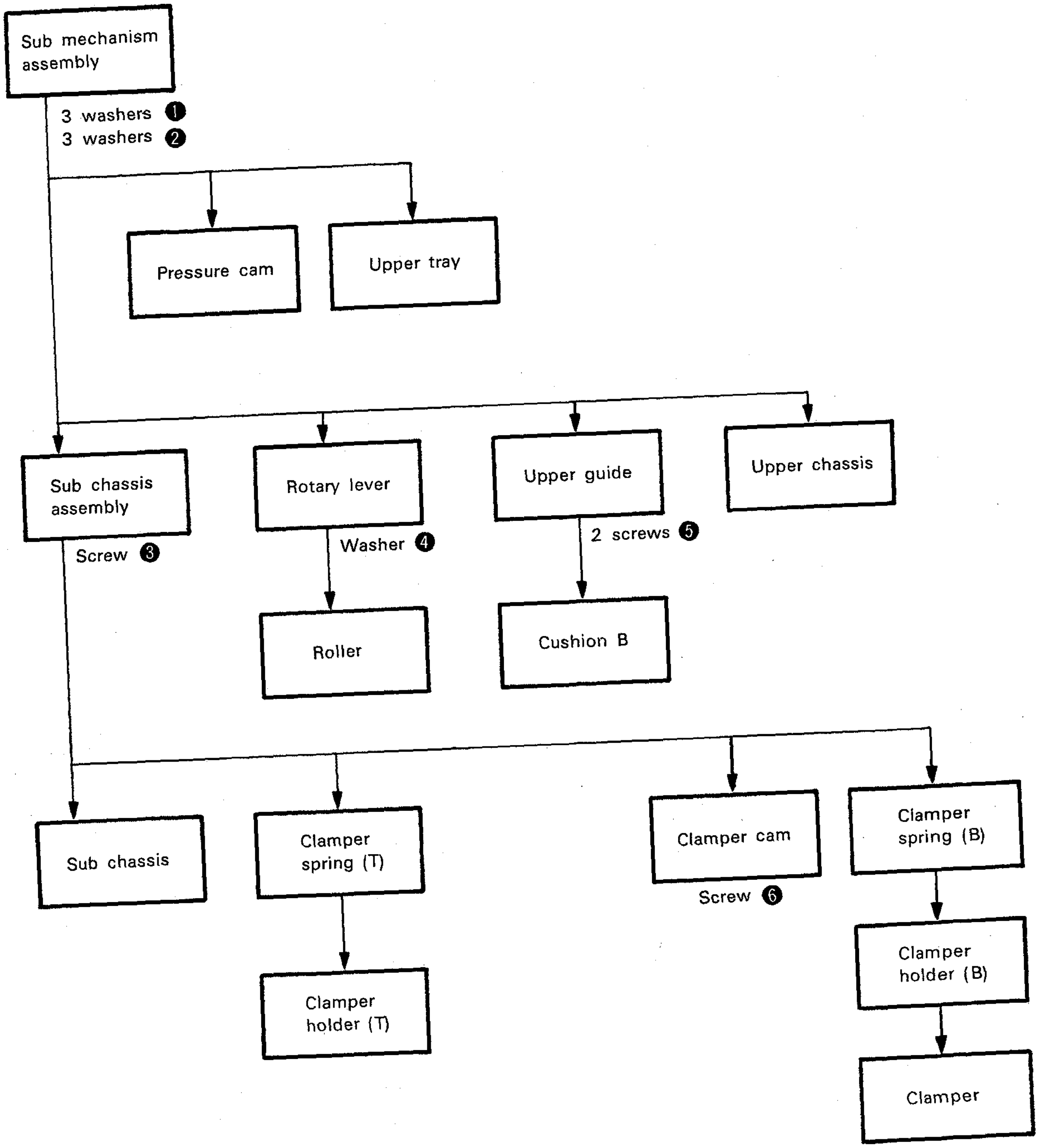
4. DISASSEMBLY

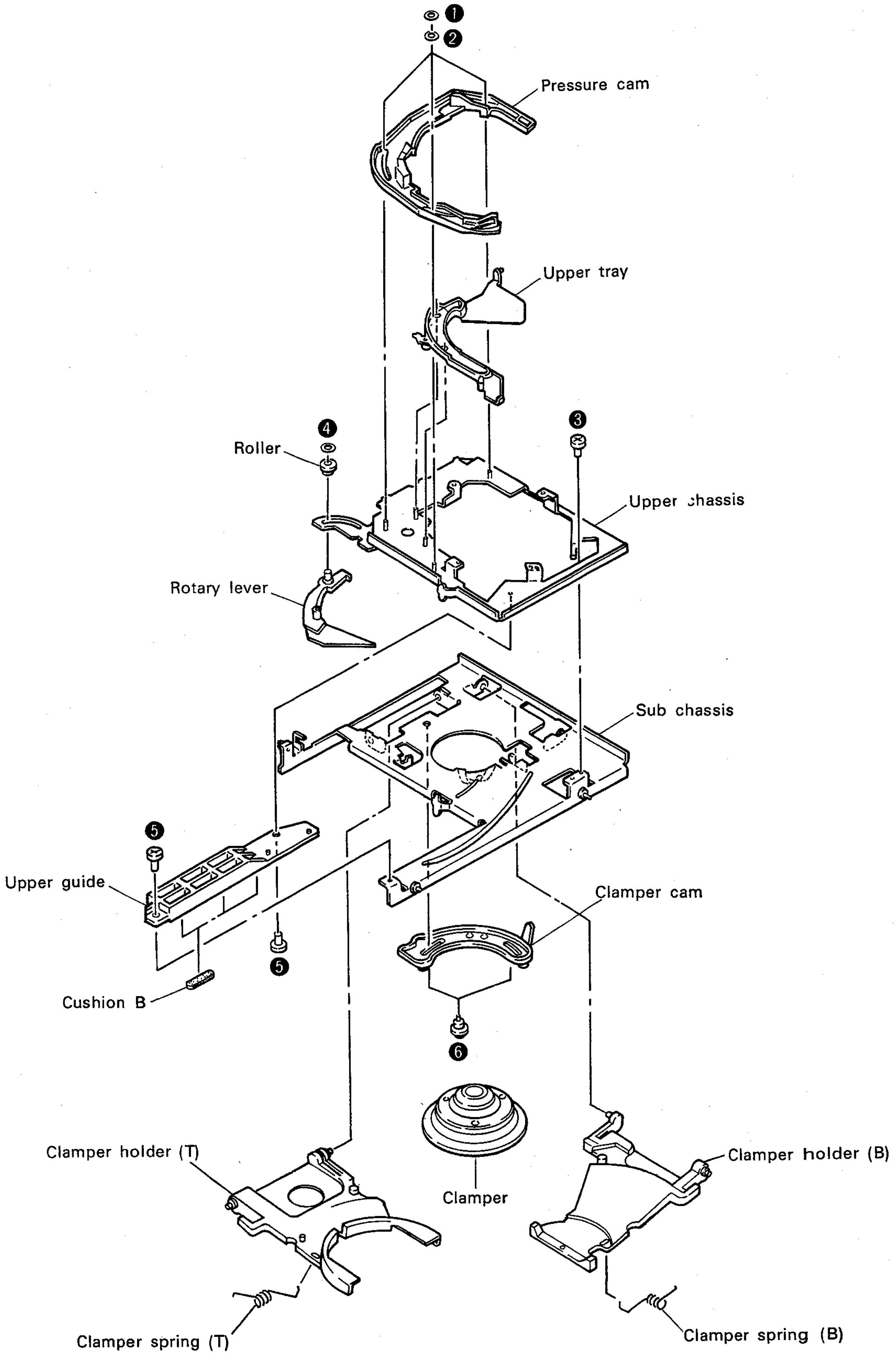

Bonnet
4 screws ❶
2 screws ❶
Main board assembly
4 screws ❷
1 screw ❾
Rear panel
5 screws ❸
SW angle
screw ❹
Power transformer
2 screws ❺
Power button
Multi mechanism assembly
4 screws ❻
Control panel assembly
6 screws ❼
Control board assembly
6 screws ❽

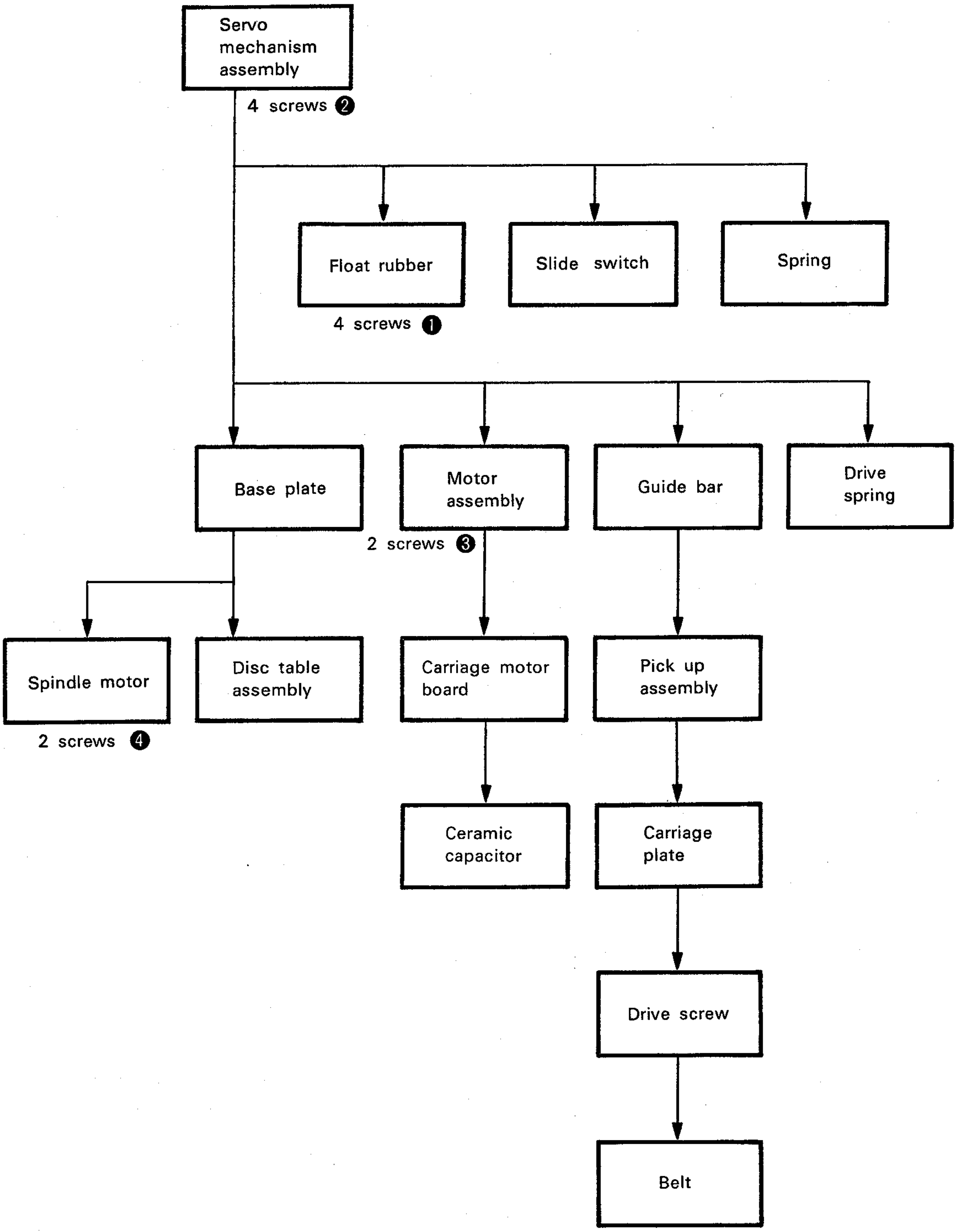

Bonnet
❶
❶
❶
❷
❷
❷
Ⓗ
Ⓘ
Ⓖ
Ⓓ
Ⓔ
Ⓕ
Ⓙ
Main board assembly
Ⓐ
Ⓑ
Ⓒ
Multi mechanism assembly
❻
❻
❻
❻
Power switch board assembly
❹
❺
Power transformer
Ⓗ
Ⓘ
Power SW joint
SW angle
Ⓙ
Ⓓ
Ⓔ
Ⓕ
Ⓖ
❸
❾
Rear panel
❼
❽
❽
Ⓒ
Ⓐ
Ⓑ
Power button
Control board assembly
❼
Control panel assembly

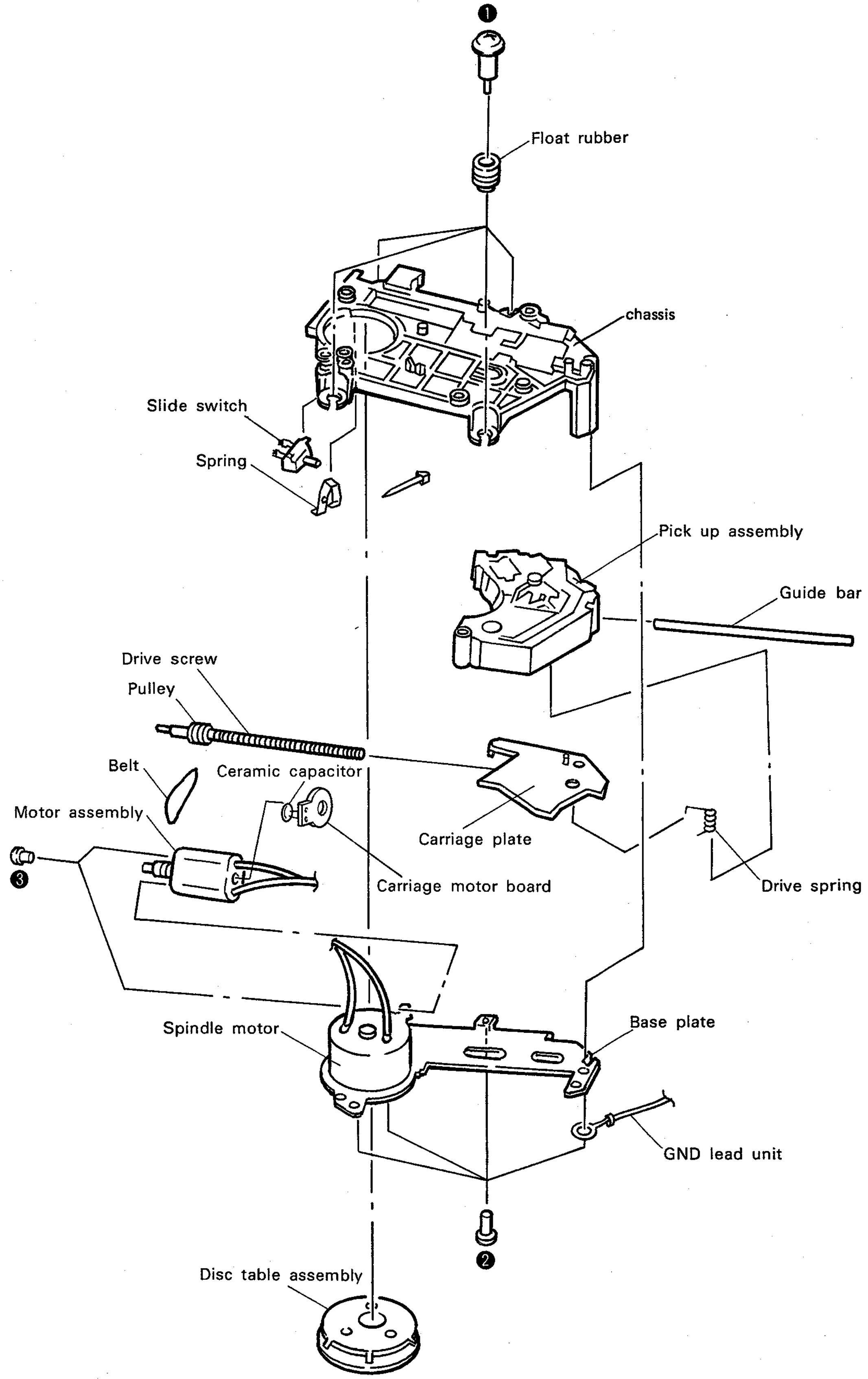

Multi mechanism assembly
8 washers ❶
8 washers ❷
Sub mechanism assembly
Motor assembly (A)
2 screws ❸
Motor assembly (B)
2 screws ❹
Drive lever
washer ❺
Switch board assembly
2 screws ❻
Select board assembly
Screw ❿
Stair L
Stair R
Stair spring
Lock spring
Lock lever
Bottom guide
4 screws ❼
Screw ❽
Eject lever
Eject spring
Damper assembly
Top guide
4 screws ❾
Rack
Drive plate
Operation plate
Steel ball 4ϕ
SM select
SM spring
Roller


Stair spring
❺
Drive lever
❶
❷
Stair L
Select board assembly
Lock lever
❿
❹
Lock spring
Sub mechanism assembly
❻
❷ ❶
Motor assembly (B)
❸
switch board assembly
Main chassis
Stair R
❷ ❶
Motor assembly (A)
Operation plate
Drive plate
Steel ball 4φ
SM select
Rack
SM spring
Roller
Top guide
❾
❾
Bottom guide
Eject lever
❼
❼
Eject spring
❽
Damper assembly


Sub mechanism assembly
3 washers ❶
3 washers ❷
Pressure cam
Upper tray
Sub chassis assembly
Rotary lever
Upper guide
Upper chassis
Screw ❸
Washer ❹
2 screws ❺
Roller
Cushion B
Sub chassis
Clamper spring (T)
Clamper cam
Clamper spring (B)
Screw ❻
Clamper holder (B)
Clamper holder (T)
Clamper


❶
❷
Pressure cam
Upper tray
❹
Roller
❸
Upper chassis
Rotary lever
Sub chassis
❺
Upper guide
Clamper cam
❺
Cushion B
❻
Clamper holder (T)
Clamper
Clamper holder (B)
Clamper spring (T)
Clamper spring (B)


Servo mechanism assembly
4 screws ❷
Float rubber
4 screws ❶
Slide switch
Spring
Base plate
Motor assembly
2 screws ❸
Guide bar
Drive spring
Spindle motor
2 screws ❹
Disc table assembly
Carriage motor board
Pick up assembly
Ceramic capacitor
Carriage plate
Drive screw
Belt

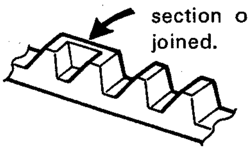

❶
Float rubber
chassis
Slide switch
Spring
Pick up assembly
Guide bar
Drive screw
Pulley
Belt
Ceramic capacitor
Motor assembly
❸
Carriage plate
Carriage motor board
Drive spring
Spindle motor
Base plate
GND lead unit
❷
Disc table assembly

ASSEMBLY KNOW-HOW

Loading Assembly

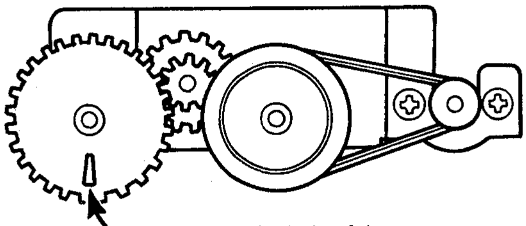
1. Gear and rack synchronization

Install by matching positions of left side gear (Last stage) and rack with unit facing you.



Assemble by matching one chipped off section of gear to where a section of the peak of rack is joined.

To be more specific, shift the rack manually to rearmost part (i.e. state of completely clamped) and assemble after rotating the gear unit as shown in Fig. below. In this way, it should be automatically synchronized. In the worst case when assembled defectively, it is easily noticed because it stops during loading.



Rotate so as the hole of the gear is positioned downward.

2. The gear unit assembling screws in shown above should be always used specified one.

Always assemble the gear unit (L side) with PCZ30P040FMC. Assembly of mechanical section uses almost always BBZ30P060FMC but when this screw is used accidentally to assemble the gear unit, not only the rack malfunctions but also the teeth section of the rack may be damaging.

3. Home position marking of rack

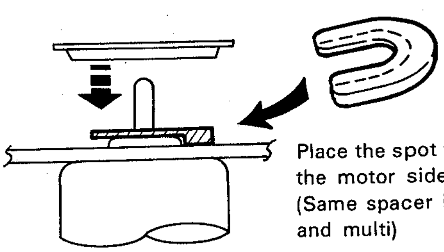
Be sure to see to it that the removal and assembly of the mechanical unit are performed with the rack in the home position.
The home position is when the guide shaft ③ -a of the rack becomes horizontally aligned to the hole ③ -b of gear angle L.

4. Vertical motion servo mechanism deck position marking

There is 1-6 carved seals on the upper section of the mechanism and if the tip of the synchronization lever is matched to this pattern carved seals, it becomes the specified position. When assembling the mechanical section, if it is matched to 3 or 4, screw securing becomes easy.
Moreover, single magazine is played at the "3" position.

5. Disc table pressure-in spacer

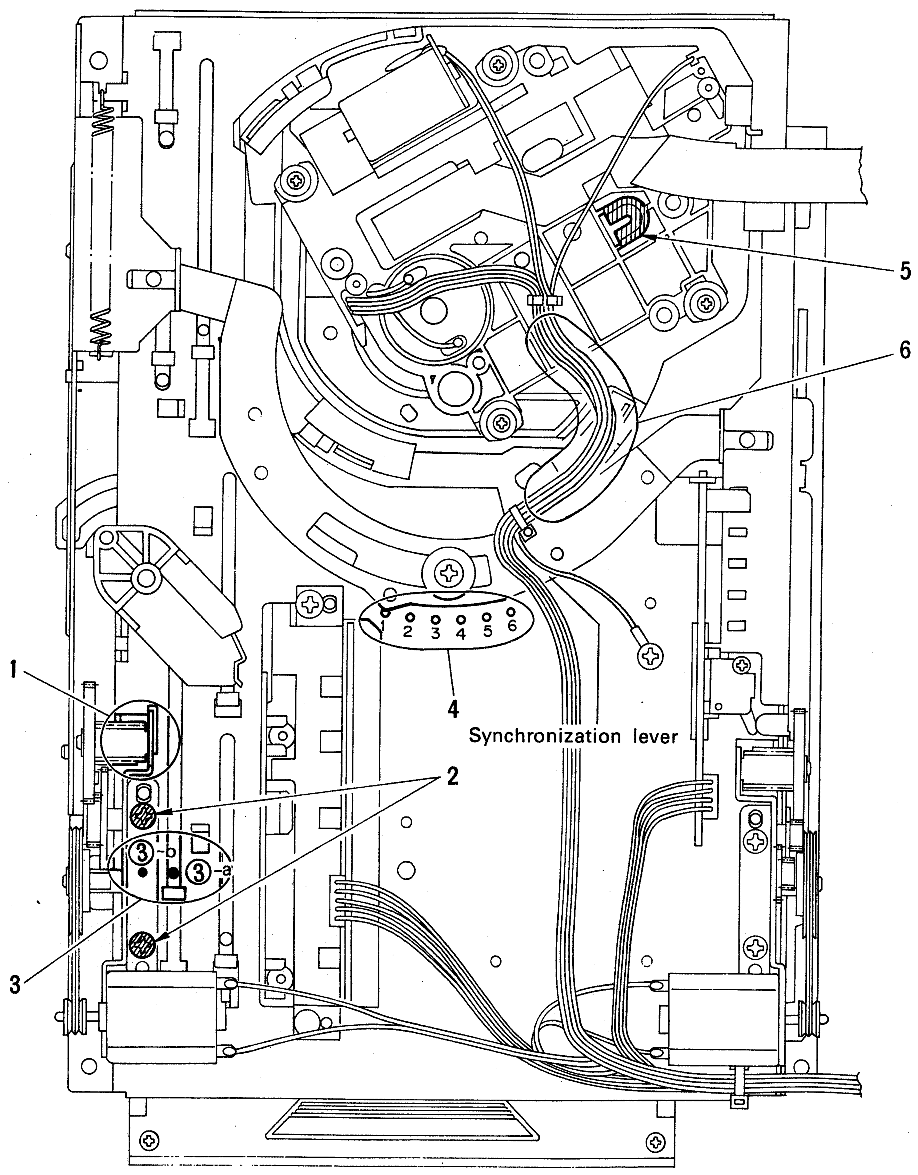
On the plastic section of the servo mechanism, a disc table pressure-in spacer is formed. When replacing disc table and motor, cut off and use as a spacer.



Place the spot facing section on the motor side.
(Same spacer is O.K. for single and multi)

6. Provide for a little slacking to the connector lead from the servo mechanism during styling.

As the servo mechanism's performing position goes up and down from the first sheet to the sixth sheet, provide for slacking as shown in the Fig. during binding.

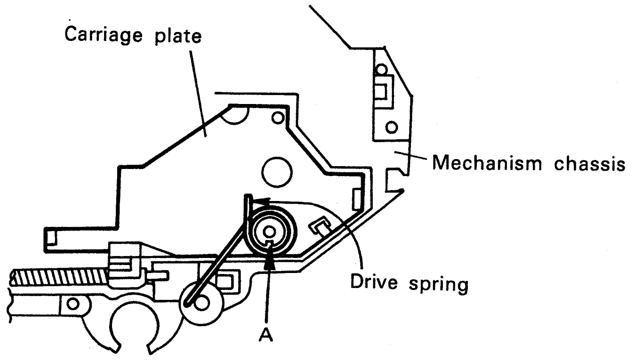

1
2
3
3-b
3-a
4
5
6
1 2 3 4 5 6
Synchronization lever

Multi-mechanism appearance diagram

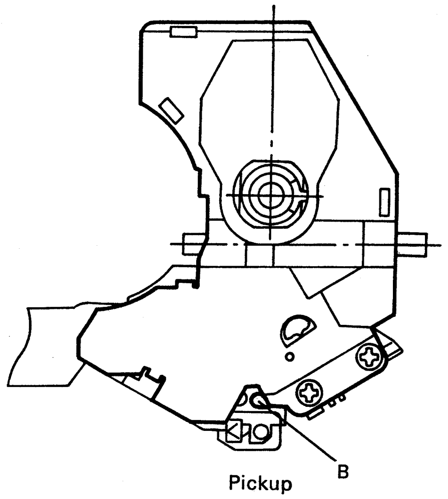
Servo Mechanism

1. How to hook of drive spring

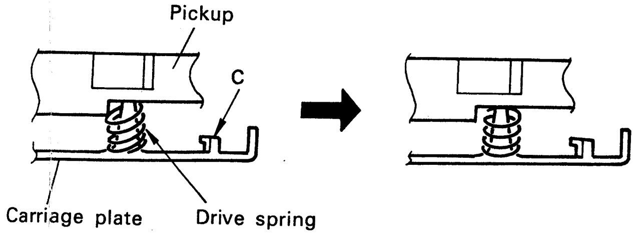
- Place the carriage plate at outermost side of circumference.
- Place the drive spring to the right rotating position as possible with the shorter arm side up to the spring hooking pin (A) of carriage plate.


Carriage plate
Mechanism chassis
Drive spring
A

- Pass guide bar through pickup and first insert right side of guide bar to installing position of mechanism chassis. Then while supposing to insert pin (A) of carriage plate into long slot (B) of pickup, insert left side of guide bar into installing position of mechanism chassis.



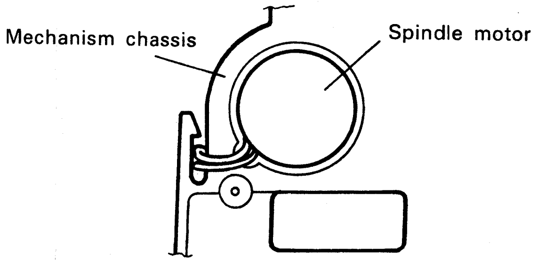
- When drive spring rotates when hooking onto hook (C) of carriage plate with the longer arm of drive spring, use a pair of tweezers to rotate to the right the shorter arm of the drive spring and return it to the specified position.


Pickup
C
Carriage plate
Drive spring

(Pickup is run aground onto the spring)

2. As the carriage plate forcibly pushes the switch because there is no stopper in the inner circumference, caution should be exercised when moving the pickup in the test mode.

3. When removing the base plate (Sheet metal part) and reattaching, it is difficult to attach if the lead wire of the spindle motor is not in the notch of the mechanism chassis.


Mechanism chassis
Spindle motor

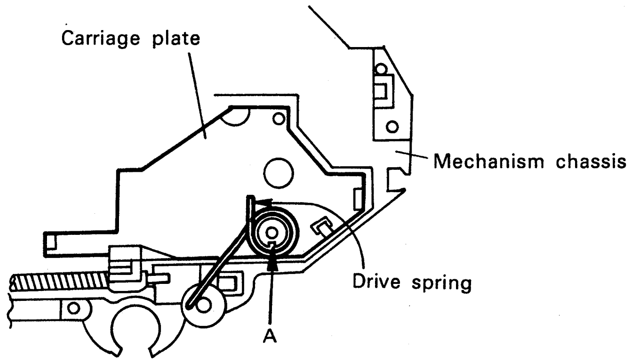
Supplement

- In order to confirm whether the drive spring is correctly hooked or not, it suffices to ascertain that the pickup is first manually drawn to the outer circumference side and returns to the inner circumference side when the hand is released in the assembled state.

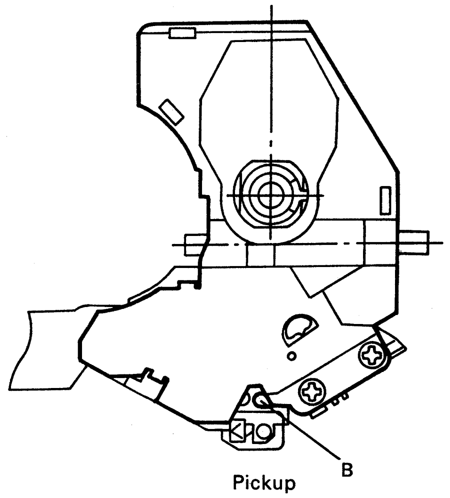
Servo Mechanism

1. How to hook of drive spring

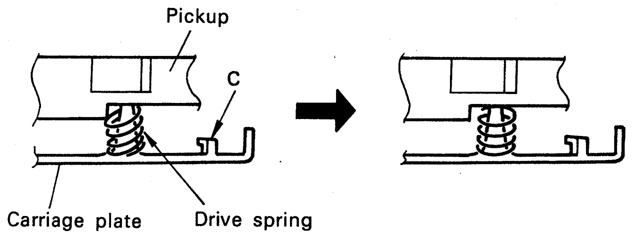
- Place the carriage plate at outermost side of circumference.
- Place the drive spring to the right rotating position as possible with the shorter arm side up to the spring hooking pin (A) of carriage plate.



- Pass guide bar through pickup and first insert right side of guide bar to installing position of mechanism chassis. Then while supposing to insert pin (A) of carriage plate into long slot (B) of pickup, insert left side of guide bar into installing position of mechanism chassis.



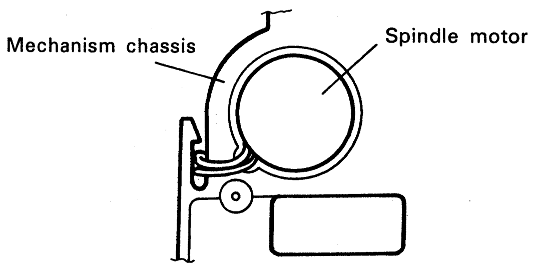
- When drive spring rotates when hooking onto hook (C) of carriage plate with the longer arm of drive spring, use a pair of tweezers to rotate to the right the shorter arm of the drive spring and return it to the specified position.



(Pickup is run aground onto the spring)

2. As the carriage plate forcibly pushes the switch because there is no stopper in the inner circumference, caution should be exercised when moving the pickup in the test mode.

3. When removing the base plate (Sheet metal part) and reattaching, it is difficult to attach if the lead wire of the spindle motor is not in the notch of the mechanism chassis.



Supplement

- In order to confirm whether the drive spring is correctly hooked or not, it suffices to ascertain that the pickup is first manually drawn to the outer circumference side and returns to the inner circumference side when the hand is released in the assembled state.

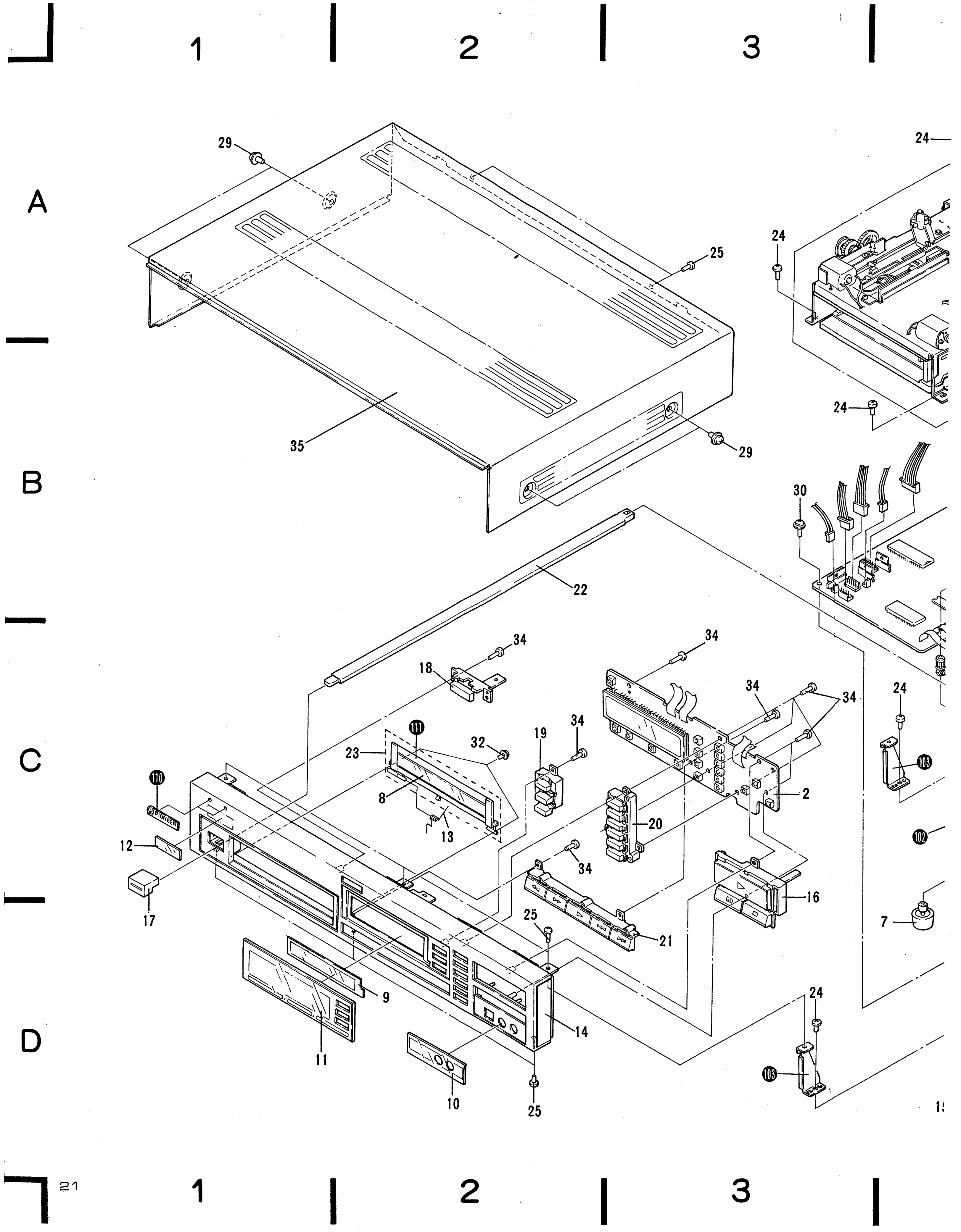
MEMO

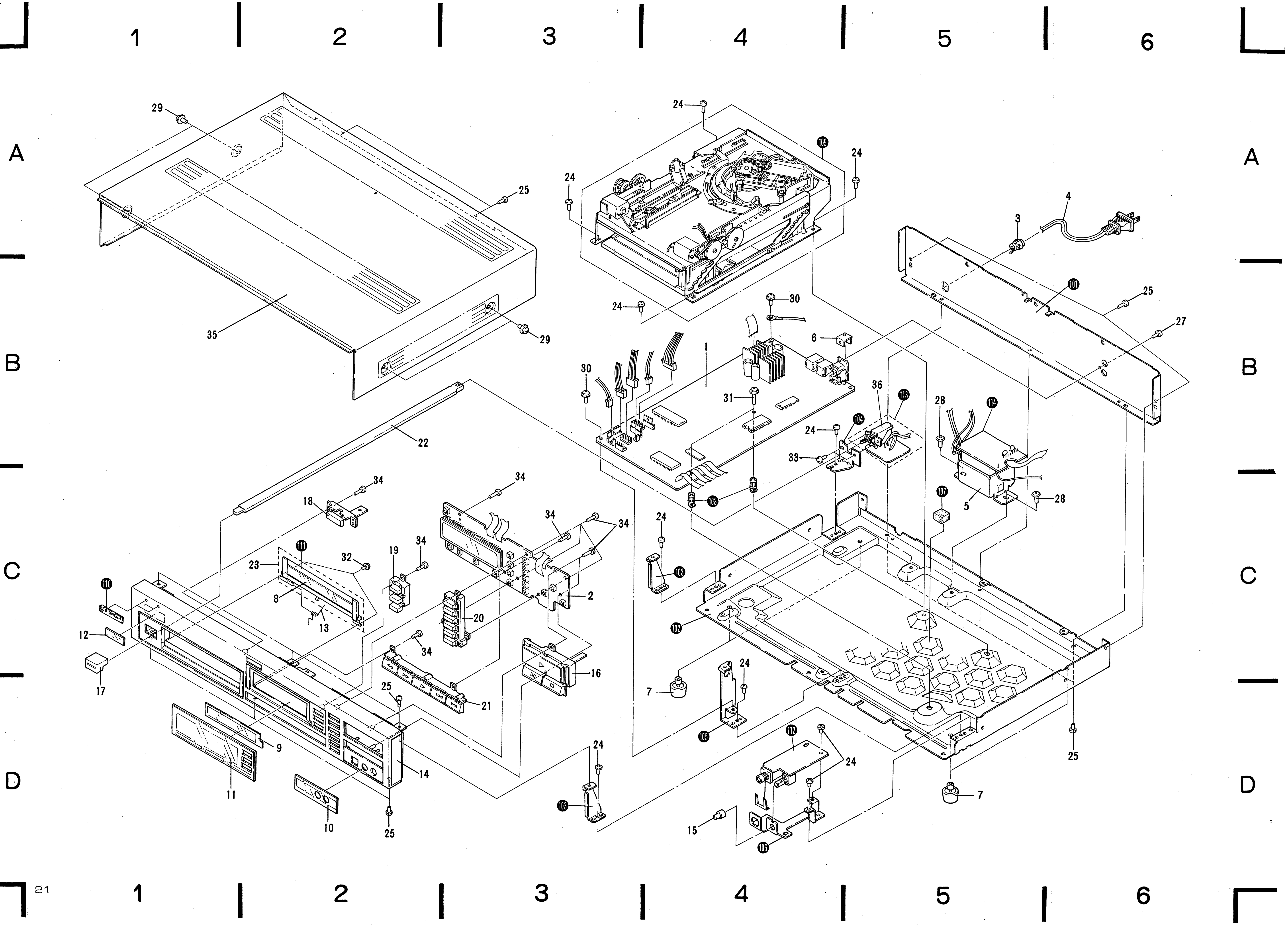
5. EXPLODED VIEWS AND PARTS LIST

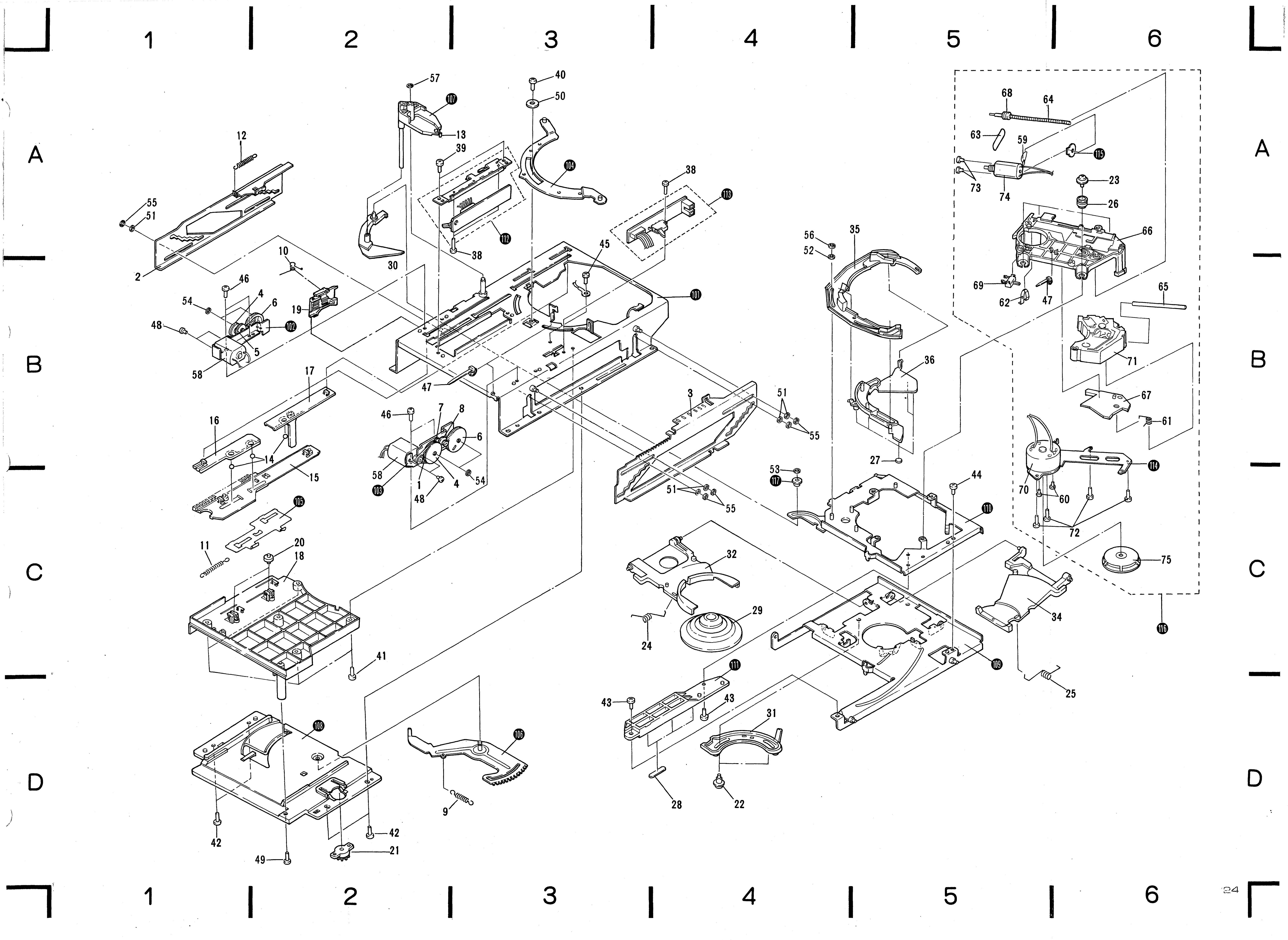
NOTES:
- *Parts without part number cannot be supplied.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★ GENERALLY MOVES FASTER THAN★
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
- *Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*

Parts List of Exterior

Mark	No.	Part No.	Description
⚠ ◉	1	PWZ1159	Main board assembly
◉	2	PWZ1160	Control board assembly
⚠	3	CM-22C	Strain relief
⚠	4	PDG1002	AC Power cord
⚠ ★	5	PTT1026	Power transformer (AC120V)
	6	PBK1001	GND plate
	7	REC-369	Leg assembly
	8	PAM1103	Door name plate
	9	PAM1067	FL filter
	10	PAM1068	Phono name plate
	11	PAN1069	Display window
	12	PAM1074	Panel name plate
	13	PBH-456	Door spring
	14	PNW1147	Control panel
	15	PAC-266	Headphone konb (PHONES LEVEL)
	16	PAC1095	Function button
	17	PAC1097	Power button
	18	PAC1098	Eject button
	19	PAC1100	TRP button
	20	PAC1101	DISC button
	21	PAC1112	Operation button
	22	PNY-528	Power SW joint
	23	PYY1031	Door assembly
	24	BBZ30P060FCC	Screw
	25	BBZ30P060FZK	Screw
	26		.....
	27	BBZ30P080FZK	Screw
	28	BBZ40P080FCC	Screw
	29	FBT40P080FZK	Screw
	30	IBZ30P060FCC	Screw
	31	IBZ30P150FCU	Screw
	32	IPZ30P060FMC	Screw
	33	PMZ30P060FCU	Screw
	34	PPZ30P080FMC	Screw
	35	PNA1107	Bonnet
⚠ ★★	36	PSA-009	Power switch
	101		Rear panel
	102		Base
	103		Angle
	104		SW angle
	105		Angle (C)
	106		Angle (P)
	107		Cussion
	108		PCB spacer
	109		Multi machanism assembly
	110		Name plate
	111		Door
	112		Headphone board assembly
	113		Power switch board assembly
	114		Transformer board assembly




A
B
C
D


1
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A
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57
107
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113
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101
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6
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14
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114
15
1
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54
27
53
44
103
48
117
70
60
105
51
55
110
72
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75
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24
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111
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116

Parts List

Mark	No.
★★	1
	2
	3
	4
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	17
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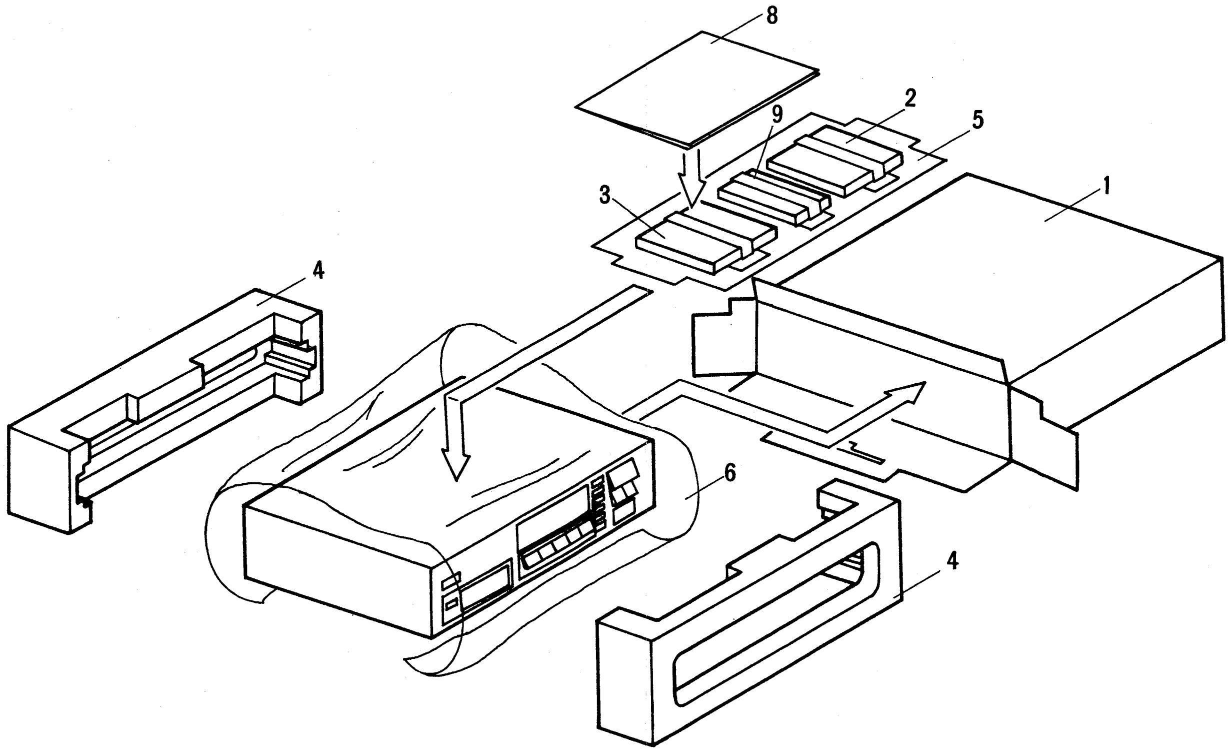
Parts List of Mechanism Section

Mark	No.	Part No.	Description
★★	1	PEB1015	Belt
	2	PNB1028	Stair (L)
	3	PNB1029	Stair (R)
	4	PNW1095	Gear pulley
	5	PNW1096	Gear
	6	PNW1097	Gear
	7	PNW1122	Gear
	8	PNW1098	Idoler gear
	9	PBH-465	Eject spring
	10	PBH1014	Lock spring
	11	PBH1015	SM spring
	12	PBH1018	Stair spring
	13	PBK1009	Drive spring
	14	PBP-001	Steel ball 4ϕ
	15	PNW1099	Rack
	16	PNW1100	Drive plate
	17	PNW1101	Operation plate
	18	PNW1102	Top guide
	19	PNW1104	Lock lever
	20	PNY-386	Roller
	21	PXC-016	Damper assembly
	22	PBA-125	Screw
	23	PBA1002	Screw
	24	PBH1016	Clamper spring(T)
	25	PBH1017	Clamper spring(B)
	26	PEB1014	Float rubber
	27	PED1001	Cushion (A)
	28	PED1002	Cushion (B)
	29	PNW1068	Clamper
	30	PNW1105	Rotary lever
	31	PNW1106	Clamper cam
	32	PNW1107	Clamper holder (T)
	33		·····
	34	PNW1108	Clamper holder (B)
	35	PNW1110	Pressure cam
	36	PNW1111	Upper tray
	37		·····
	38	BBZ20P080FMC	Screw
	39	BBZ30P060FMC	Screw
	40	BBZ30P060FMC	Screw
	41	BBZ30P060FMC	Screw
	42	BBZ30P060FMC	Screw
	43	BBZ30P060FMC	Screw
	44	BBZ30P060FMC	Screw
	45	BBZ30P060FMC	Screw
	46	PCZ30P040FMC	Screw
	47	PEC-107	Binder
	48	PMZ20P030FMC	Screw
	49	PPZ30P080FMC	Screw
	50	WA30F120M100	Washer
	51	WA31D054D050	Washer
	52	WA31D054D050	Washer
	53	WT12D032D025	Washer
	54	WT25D047D025	Washer
	55	WT25D047D025	Washer
	56	WT25D047D025	Washer
	57	WT31D054D025	Washer
★★	58	PYY1025	Motor assembly (LOADING, DISC SELECT)
	59	CGDYX104M25	Ceramic capacitor
	60	PBA-209	Screw
	61	PBH1008	Drive spring
	62	PBK1010	Spring
★★	63	PEB1012	Belt
	64	PLA1003	Drive screw
	65	PLA1004	Guide bar
	66	PNW1062	Chassis
	67	PNW1063	Carriage plate
	68	PNW1066	Pully
★★	69	PSH1003	Slide switch (INSIDE)
★★	70	PXM1001	Spindle motor
	71	PWY1003	Pick up assembly
	72	BPZ20P080FZK	Screw
	73	PMZ20P030FMC	Screw
★★	74	PYY1025	Motor assembly (CARRIAGE)
	75	PYY1027	Disc table assembly
	101		Main chassis
	102		Gear angle (L)
	103		Gear angle (R)
	104		Lever
	105		SM select
	106		Eject lever
	107		Drive lever
	108		Bottom guide
	109		Sub chassis
	110		Upper chassis
	111		Upper guide
	112		Switch board assembly
	113		Select board assembly
	114		Base plate
	115		Carriage motor board
	116		Servo mechanism assembly
	117		Roller

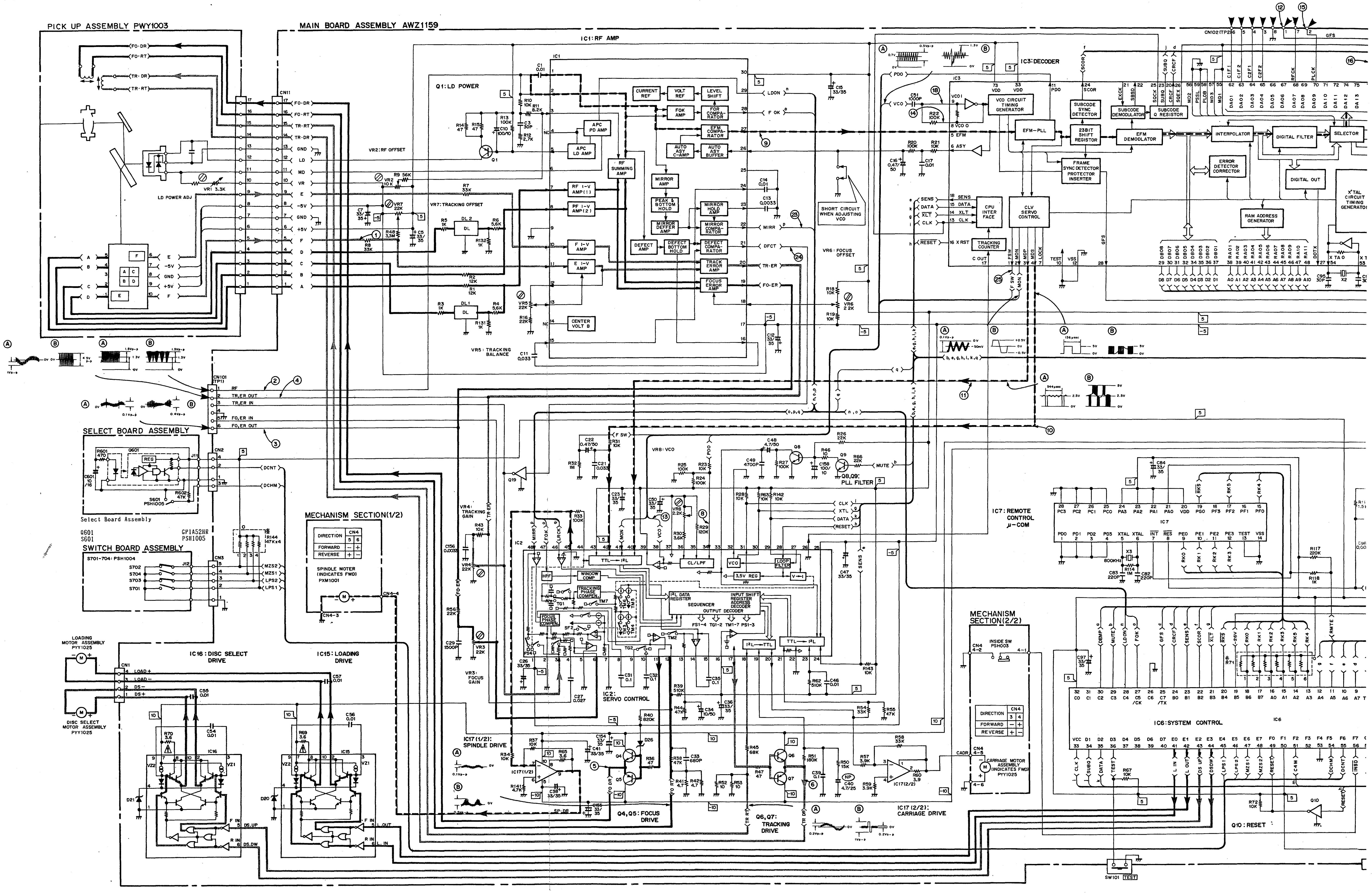
6. PACKING

Parts List of Packing

Mark	No.	Part No.	Description
	1	PHG1080	CD Packing case
	2	PXA1050	Magazine assembly
	3	PXA1043	Single magazine assmebly
	4	PHA1021	Protecter
	5	PHC1005	Accessory holder
	6	Z23-007	Mat sheet
	7	PDE1001	Connection cord with pin plug
	8	PRB1022	Operating instructions
	9	PWW1008	Remote control unit
	51		Battery (UM-4)

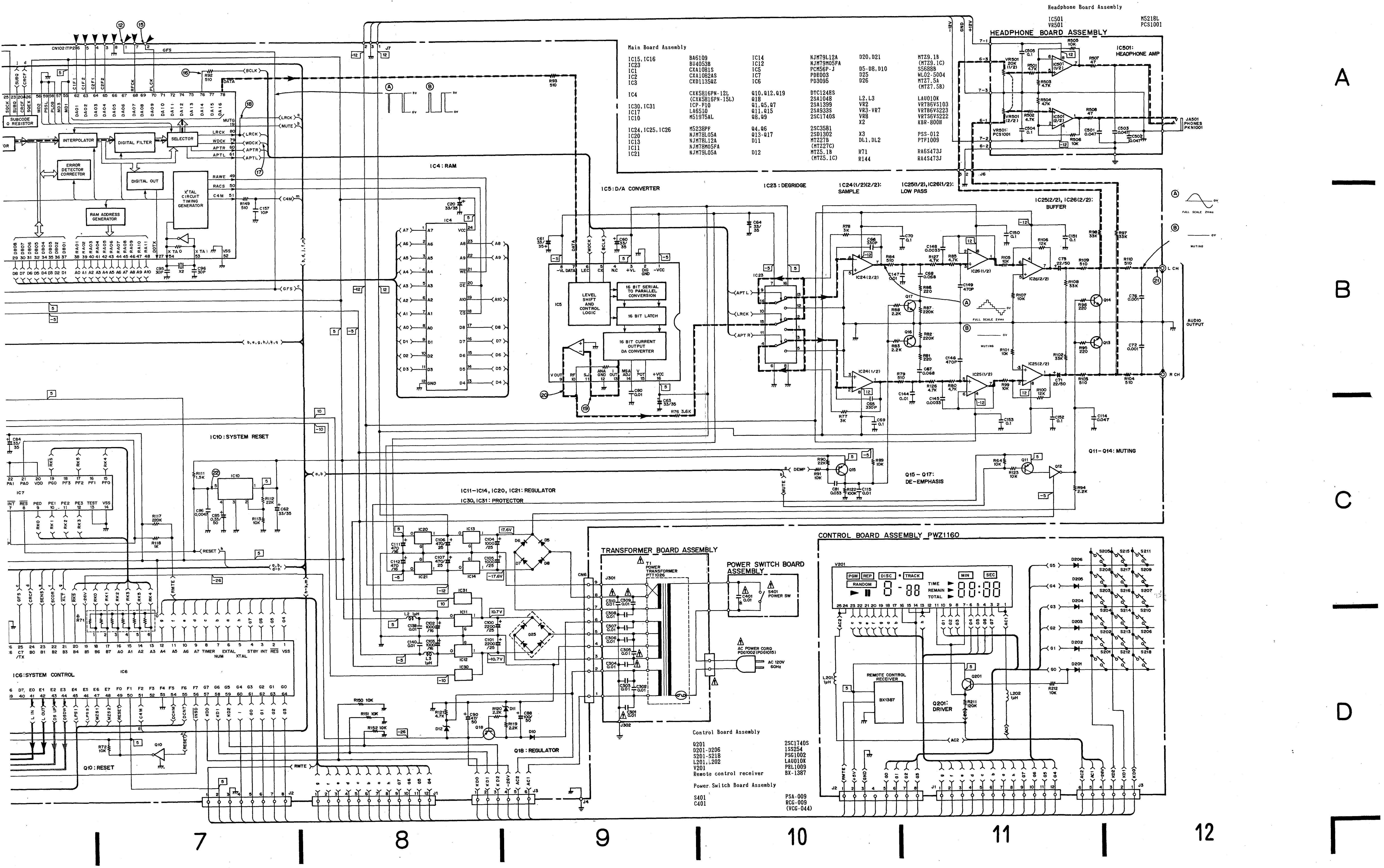


7. SCHEMATIC DIAGRAM


1
2
3
4
5
6
7
A
B
C
D
PICK UP ASSEMBLY PWY1003
MAIN BOARD ASSEMBLY AWZ1159
IC1:RF AMP
Q1:LD POWER
LD POWER ADJ
VR1 3.3K
VR2:RF OFFSET
VR7:TRACKING OFFSET
VR5: TRACKING BALANCE
RF SUMMING AMP
APC PD AMP
APC LD AMP
CURRENT REF
VOLT REF
LEVEL SHIFT
FOK AMP
FOK COMPA-RATOR
EFM COMPA-RATOR
AUTO ASY C-AMP
AUTO ASY BUFFER
MIRROR AMP
PEAK & BOTTOM HOLD
MIRROR DEFFER AMP
MIRROR HOLD AMP
MIRROR COMPA-RATOR
DEFECT AMP
DEFECT BOTTOM HOLD
DEFECT COMPA-RATOR
TRACK ERROR AMP
FOCUS ERROR AMP
RF I-V AMP(1)
PF I-V AMP(2)
F I-V AMP
E I-V AMP
CENTER VOLT B
SHORT CIRCUIT WHEN ADJUSTING VCO
VR6: FOCUS OFFSET
IC3:DECODER
VCO CIRCUIT TIMING GENERATOR
EFM-PLL
23BIT SHIFT REGISTER
EFM DEMODULATOR
SUBCODE SYNC DETECTOR
SUBCODE DEMODULATOR
SUBCODE Q RESISTOR
FRAME SYNC DETECTOR PROTECTOR INSERTER
INTERPOLATOR
DIGITAL FILTER
SELECTOR
ERROR DETECTOR CORRECTOR
DIGITAL OUT
RAM ADDRESS GENERATOR
X'TAL CIRCUIT TIMING GENERATOR
CPU INTER FACE
CLV SERVO CONTROL
TRACKING COUNTER
CN101 (TP11)
RF
TR,ER OUT
TR,ER IN
FO,ER IN
FO,ER OUT
SELECT BOARD ASSEMBLY
Select Board Assembly
Q601 GP1A52HR
S601 PSH1005
SWITCH BOARD ASSEMBLY
S701-704: PSH1004
MECHANISM SECTION(1/2)
SPINDLE MOTOR (INDICATES FWD) PXM1001
DIRECTION
FORWARD
REVERSE
VR8: VCO
Q8,Q9: PLL FILTER
VR4: TRACKING GAIN
VR3: FOCUS GAIN
IC2
IC2: SERVO CONTROL
WINDOW COMP
TRACKING PHASE COMPEN.
FOCUS PHASE COMPEN.
I²L DATA REGISTER
SEQUENCER
INPUT SHIFT REGISTER ADDRESS DECODER
OUTPUT DECODER
LOOP FILTER
3.5V REG
IC7: REMOTE CONTROL μ-COM
IC7
800KHz
MECHANISM SECTION(2/2)
INSIDE SW PSH1003
CARRAGE MOTOR ASSEMBLY (INDICATES FWD) PYY1025
IC6
IC6: SYSTEM CONTROL
LOADING MOTOR ASSEMBLY PYY1025
DISC SELECT MOTOR ASSEMBLY PYY1025
IC16: DISC SELECT DRIVE
IC15: LOADING DRIVE
IC16
IC15
IC17(1/2): SPINDLE DRIVE
Q4,Q5: FOCUS DRIVE
Q6,Q7: TRACKING DRIVE
IC17 (2/2): CARRIAGE DRIVE
Q10: RESET
SW101 TEST
CN102 (TP2)

1 2 3 4 5 6 7

NOTE:
The indicated semiconductors are representative ones only. Other alternative semiconductors may be used and are listed in the parts list.


7
8
9
10
11
12
A
B
C
D
HEADPHONE BOARD ASSEMBLY
IC501: HEADPHONE AMP
JA501 PHONES PKN1001
INTERPOLATOR
DIGITAL FILTER
SELECTOR
ERROR DETECTOR CORRECTOR
DIGITAL OUT
XTAL CIRCUIT TIMING GENERATOR
RAM ADDRESS GENERATOR
SUBCODE Q RESISTOR
IC4: RAM
IC5: D/A CONVERTER
LEVEL SHIFT AND CONTROL LOGIC
16 BIT SERIAL TO PARALLEL CONVERSION
16 BIT LATCH
16 BIT CURRENT OUTPUT DA CONVERTER
IC23: DEGRIDGE
IC24(1/2)(2/2): SAMPLE
IC25(1/2), IC26(1/2): LOW PASS
IC25(2/2), IC26(2/2): BUFFER
FULL SCALE
MUTING
AUDIO OUTPUT
L CH
R CH
Q11–Q14: MUTING
Q15–Q17: DE-EMPHASIS
IC10: SYSTEM RESET
IC7
IC6: SYSTEM CONTROL
Q10: RESET
IC11–IC14, IC20, IC21: REGULATOR
IC30, IC31: PROTECTOR
Q18: REGULATOR
TRANSFORMER BOARD ASSEMBLY
T1 POWER TRANSFORMER PTT1026
POWER SWITCH BOARD ASSEMBLY
S401 POWER SW
AC POWER CORD PDG1002 (PDG1015)
AC 120V 60Hz
CONTROL BOARD ASSEMBLY PWZ1160
PGM
REP
DISC
TRACK
RANDOM
MIN
SEC
TIME
REMAIN
TOTAL
REMOTE CONTROL RECEIVER
BX1387
Q201: DRIVER

Headphone Board Assembly

IC501	M5218L
VR501	PCS1001

Main Board Assembly

IC15, IC16	BA6109	IC14	NJM79L12A	D20, D21	MTZ9.1B
IC23	BU4053B	IC12	NJM79M05FA		(MTZ9.1C)
IC1	CXA1081S	IC5	PCM56P-J	D5-D8, D10	S5688B
IC2	CXA1082AS	IC7	PDE003	D25	WL02-5004
IC3	CXD1135QZ	IC6	PD3095	D26	MTZ7.5A
					(MTZ7.5B)
IC4	CXK5816PN-12L	Q10, Q12, Q19	DTC124ES		
	(CXK5816PN-15L)	Q18	2SA1048	L2, L3	LAU010K
IC30, IC31	ICP-F10	Q1, Q5, Q7	2SA1399	VR2	VRTB6VS103
IC17	LA6510	Q11, Q15	2SA933S	VR3-VR7	VRTB6VS223
IC10	M51975AL	Q8, Q9	2SC1740S	VR8	VRTS6VS222
				X2	KBR-800H
IC24, IC25, IC26	M5238PF	Q4, Q6	2SC3581		
IC20	NJM78L05A	Q13-Q17	2SD1302	X3	PSS-012
IC13	NJM78L12A	D11	MTZ27B	DL1, DL2	PTF1009
IC11	NJM78M05FA		(MTZ27C)		
IC21	NJM79L05A	D12	MTZ5.1B	R71	RA6S473J
			(MTZ5.1C)	R144	RA4S473J

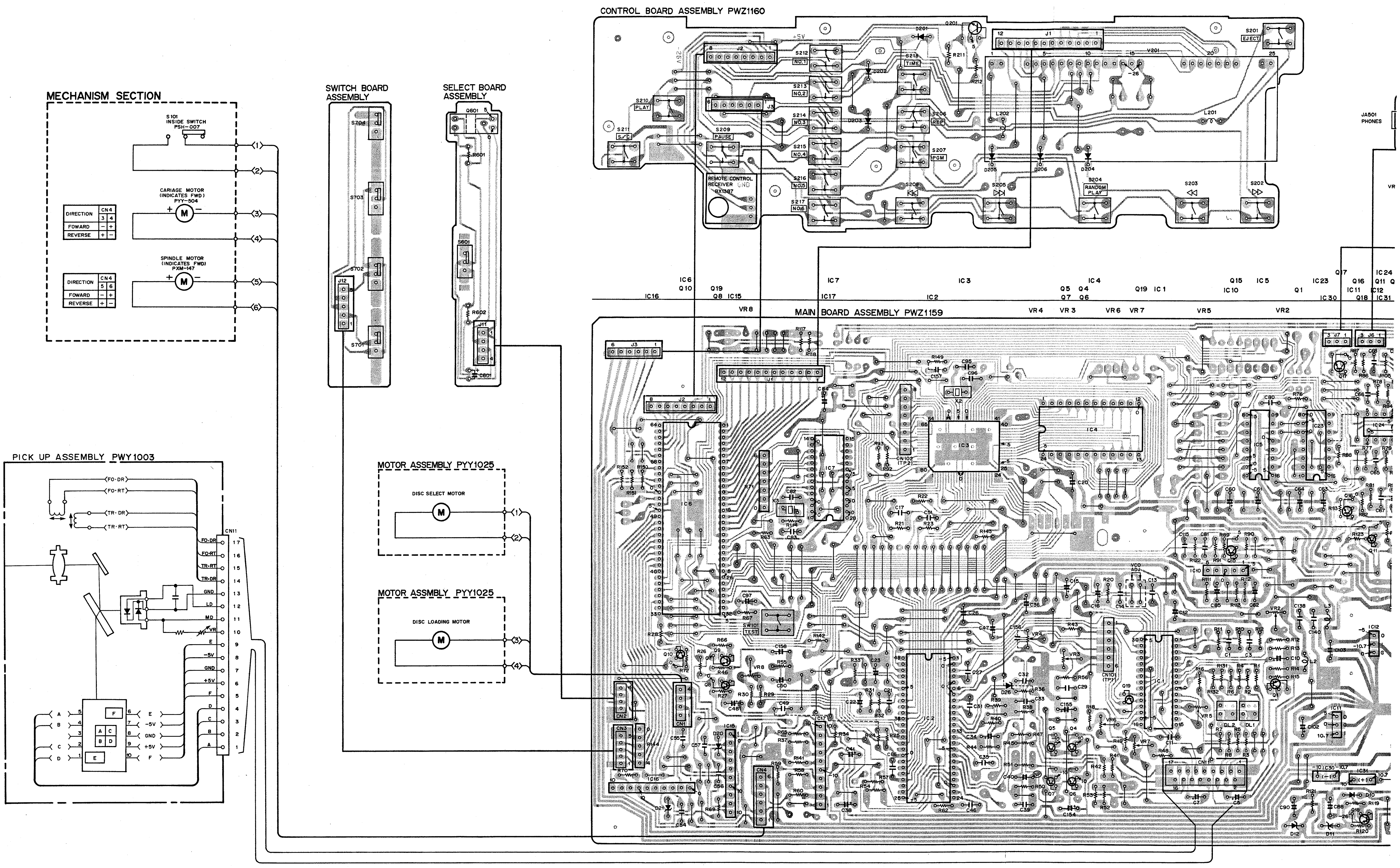
Control Board Assembly

Q201	2SC1740S
D201-D206	1SS254
S201-S218	PSG1002
L201, L202	LAU010K
V201	PEL1009
Remote control receiver	BX-1387

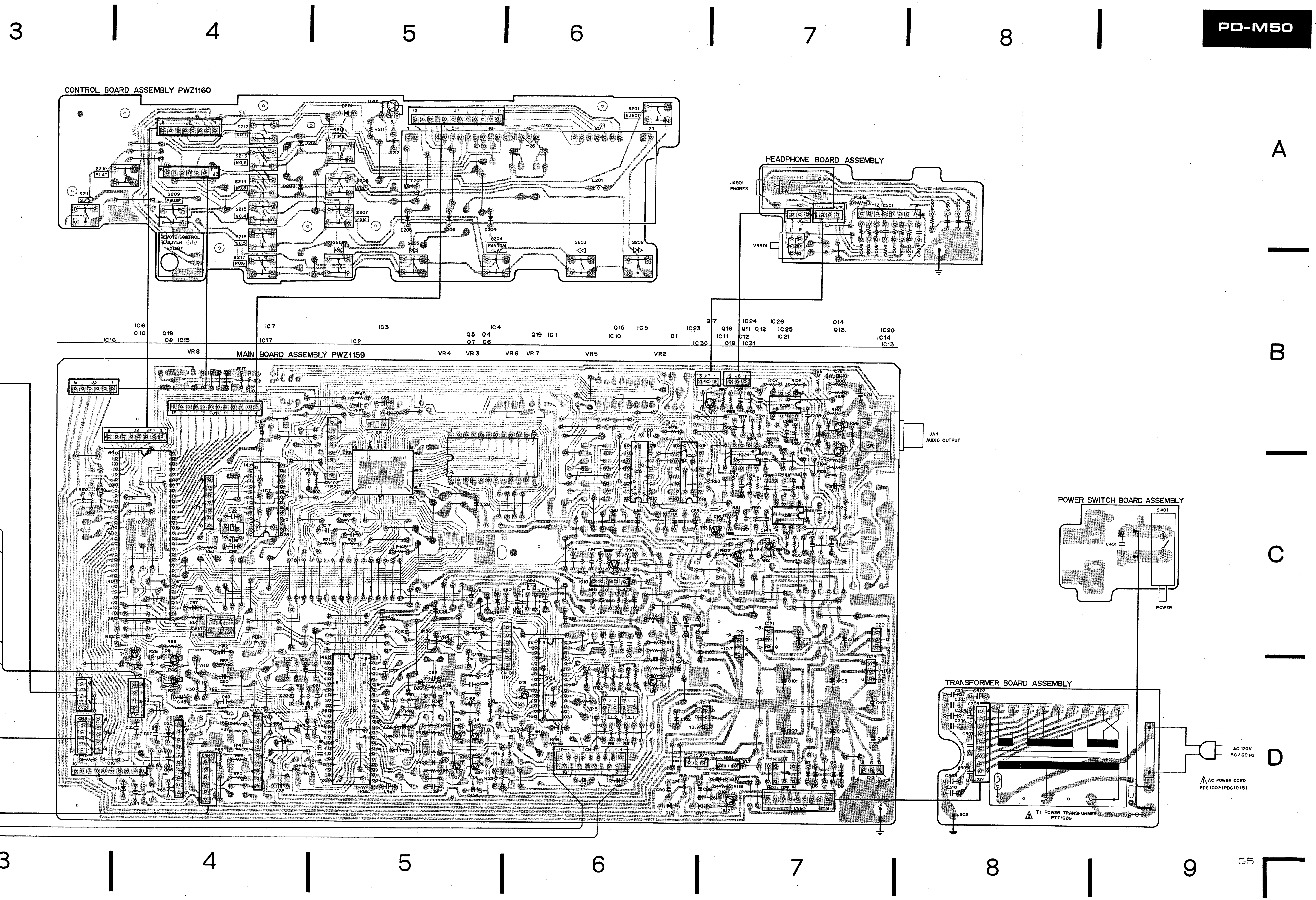
Power Switch Board Assembly

S401	PSA-009
C401	RCG-009 (VCG-044)

8. P.C. BOARDS CONNECTION DIAGRAM



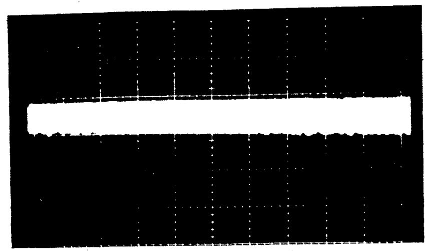
MECHANISM SECTION
S101 INSIDE SWITCH PSH-007
CARIAGE MOTOR (INDICATES FWD) PYY-504
DIRECTION
CN4
3
4
FOWARD
REVERSE
SPINDLE MOTOR (INDICATES FWD) PXM-147
5
6
SWITCH BOARD ASSEMBLY
S704
S703
S702
S701
J12
SELECT BOARD ASSEMBLY
Q601
R601
S601
R602
J11
C601
CONTROL BOARD ASSEMBLY PWZ1160
J2
J3
J1
S212 NO.1
S213 NO.2
S214 NO.3
S215 NO.4
S216 NO.5
S217 NO.6
S210 PLAY
S211 S/C
S209 PAUSE
REMOTE CONTROL RECEIVER GND RX1387
S218 TIME
S206 REP
S207 PGM
S208
S205
S204 RANDOM PLAY
S203
S202
S201 EJECT
Q201
D201
D202
D203
D204
D205
D206
R211
R212
L201
L202
V201
JA501 PHONES
MAIN BOARD ASSEMBLY PWZ1159
IC1
IC2
IC3
IC4
IC6
IC7
IC10
IC15
IC16
IC17
IC23
IC24
CN1
CN2
CN3
CN4
CN11
CN101 (TP1)
CN102 (TP2)
SW101 TEST
VR1
VR2
VR3
VR4
VR5
VR6
VR7
VR8
VCO ADJ.
PICK UP ASSEMBLY PWY1003
FO·DR
FO·RT
TR·DR
TR·RT
GND
LD
MD
VR
E
−5V
+5V
F
D
C
B
A
MOTOR ASSEMBLY PYY1025
DISC SELECT MOTOR
MOTOR ASSMBLY PYY1025
DISC LOADING MOTOR
M


3
4
5
6
7
8
9
A
B
C
D
CONTROL BOARD ASSEMBLY PWZ1160
HEADPHONE BOARD ASSEMBLY
JA501 PHONES
VR501
MAIN BOARD ASSEMBLY PWZ1159
JA1 AUDIO OUTPUT
POWER SWITCH BOARD ASSEMBLY
S401
POWER
TRANSFORMER BOARD ASSEMBLY
T1 POWER TRANSFORMER PTT1026
AC 120V 50/60 Hz
AC POWER CORD PDG1002 (PDG1015)
S201 EJECT
S202
S203
S204 RANDOM PLAY
S205
S206 REP
S207 PGM
S208
S209 PAUSE
S210 PLAY
S211 S/C
S212 NO.1
S213 NO.2
S214 NO.3
S215 NO.4
S216 NO.5
S217 NO.6
S218 TIME
REMOTE CONTROL RECEIVER GBX1087
V201
IC1
IC2
IC3
IC4
IC5
IC6
IC7
IC10
IC11
IC12
IC13
IC14
IC15
IC16
IC17
IC20
IC21
IC23
IC24
IC25
IC26
IC30
IC31
IC501
VR2
VR3
VR4
VR5
VR6
VR7
VR8
SW101 TEST
CN101 (TP11)
CN102 (TP21)
VCO ADJ
J1
J2
J3
J6
J7
J301
J302
CN1
CN2
CN3
CN4
CN6

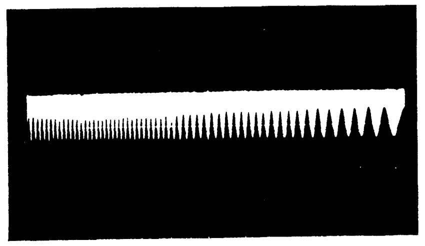
WAVEFORMS

NOTE: The encircled numbers denote measuring points in the circuit and pattern diagrams.

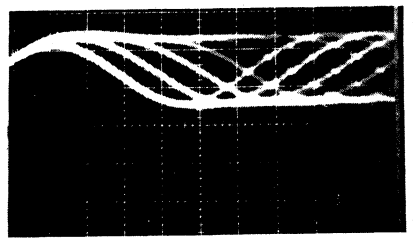
① CN11-5 Pin : PLAY MODE
100mV/div 5m sec/div



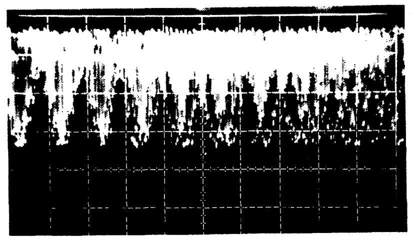
① CN11-5 Pin: SEARCH MODE
100mV/div 5m sec/div



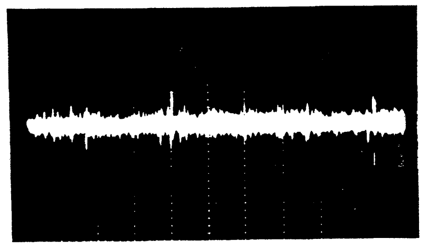
② TP1-1 Pin: PLAY
1V/div 200n sec/div



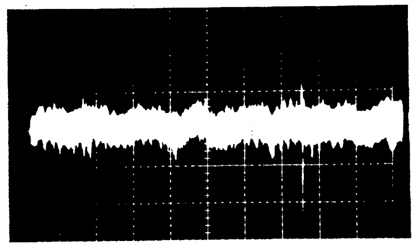
② TP1-1 Pin: SEARCH
500mV/div 5m sec/div



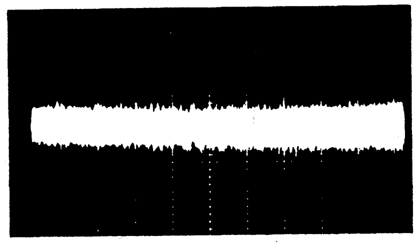
③ TP1-6 Pin: PLAY
500mV/div 10m sec/div



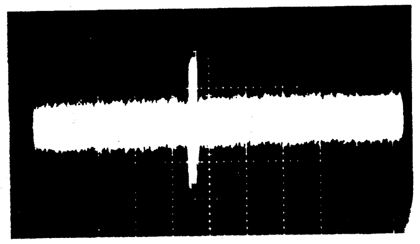
③ TP1-6 Pin: SEARCH
500mV/div 10mS/div



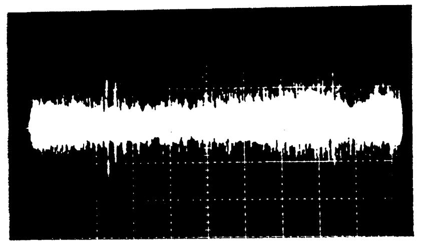
④ TP1-2 Pin: PLAY
1V/div 10mS/div



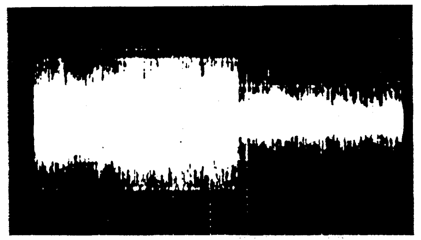
④ TP1-2 Pin: SEARCH
1V/div 10mS/div



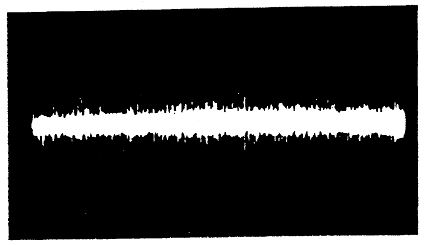
⑤ Q4 Emitter: PLAY
2V/div 10mS/div



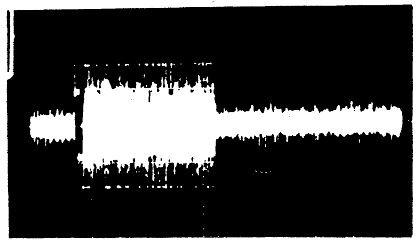
⑤ Q4E: SEARCH
2V/div 10mS/div



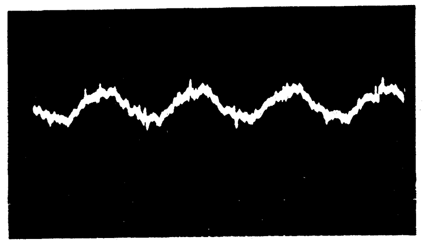
⑥ Q6E: PLAY
2V/div 10mS/div



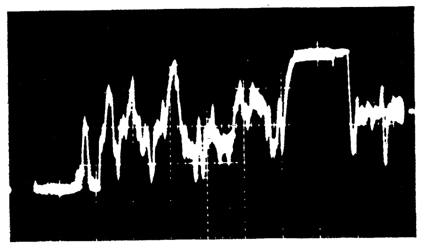
⑥ Q6E: SEARCH
2V/div 10mS/div



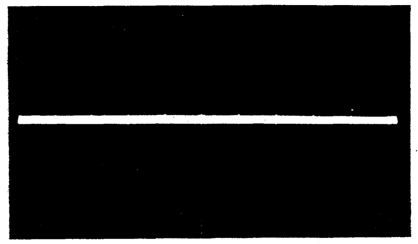
⑦ IC17-9: PLAY
2V/div 50mS/div



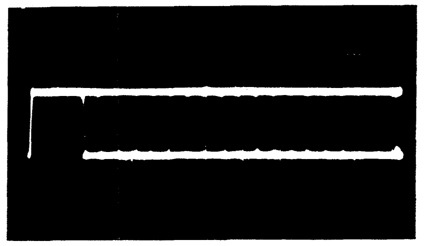
⑦ IC17-9: SEARCH
2V/div 100mS/div



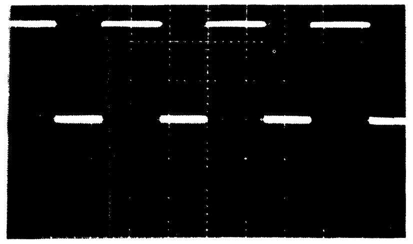
⑧ IC2, 34 Pin: PLAY
2V/div 10mS/div



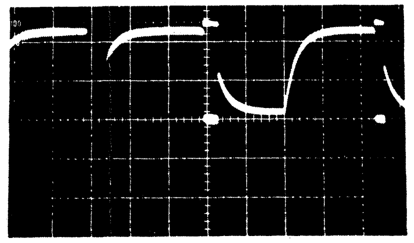
⑨ IC1 27 Pin: PLAY
2V/div 500m sec/div



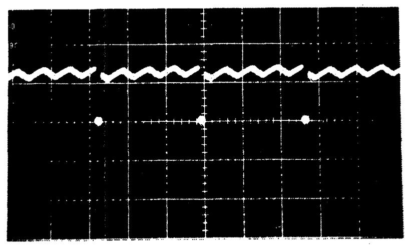
⑩ IC3-4: PLAY
2V/div 50μS/div



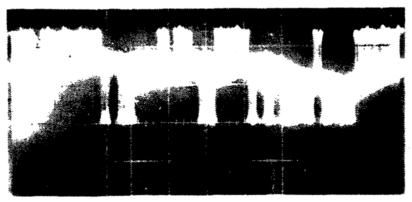
⑩ IC3-4: SEARCH
2V/div 100mS/div



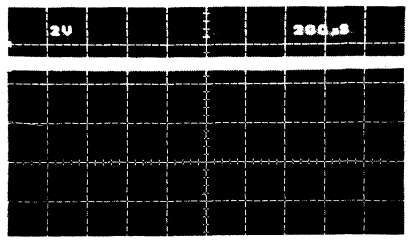
⑪ IC3-3: PLAY
2V/div 200μS/div



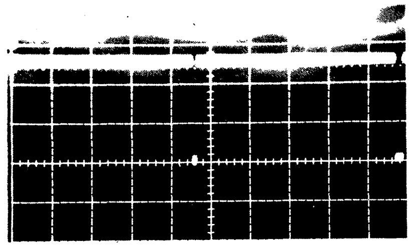
⑪ IC3-3: SEARCH
2V/div 10mS/div



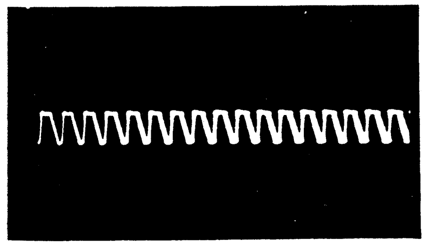
⑫ TP2-1: PLAY
2V/div 200μS/div



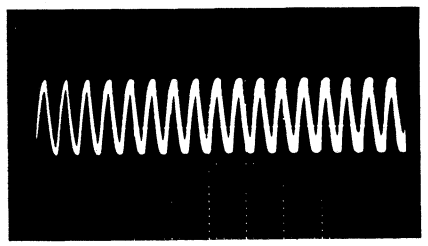
⑫ TP2-1: SEARCH
2V/div 20mS/div



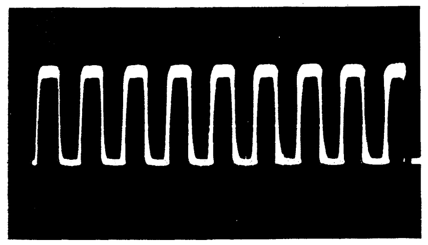
⑬ IC2-38: PLAY
2V/div 200μS/div



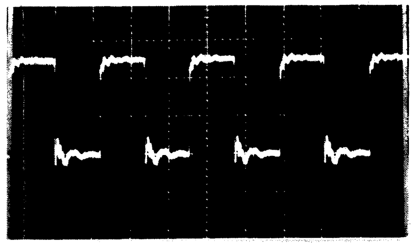
⑭ IC3-8: PLAY
2V/div 200μS/div



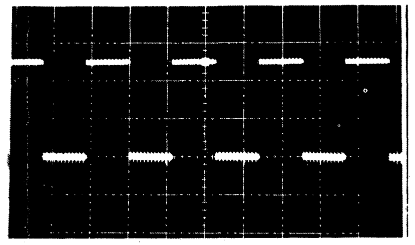
⑮ TP2-2: PLAY
2V/div 200μS/div



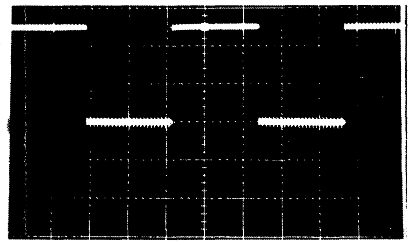
⑯ IC3-76: STOP
2V/div 200mS/div



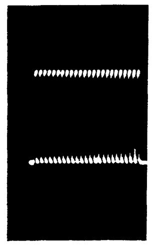
⑰ IC3-79: STOP
2V/div 5μS/div



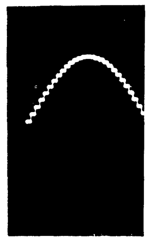
⑱ IC3-80: STOP
2V/div 5μS/div



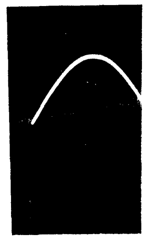
⑲ IC5-11: ST
2V/div



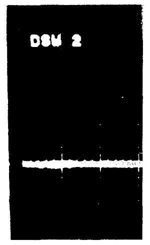
⑳ IC5-9: PL
2V/div



㉑ OUTPUT L
2V/div



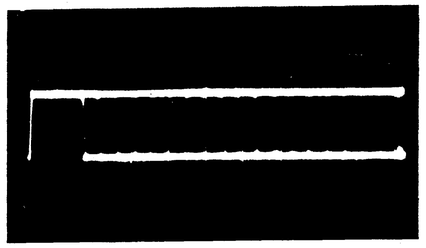
㉒ IC10-5: P
2V/div



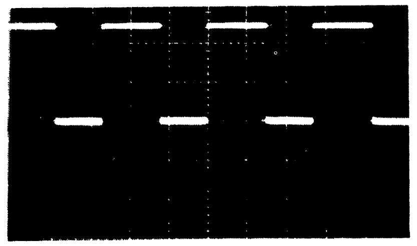
㉒ IC10-5: P
2V/div

and

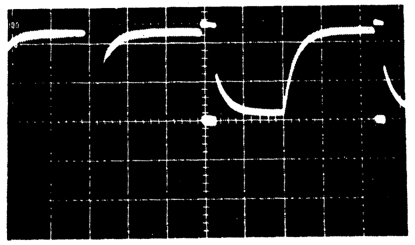
⑨ IC1 27 Pin: PLAY
2V/div 500m sec/div



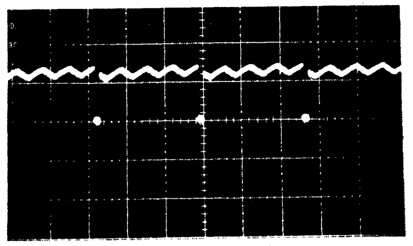
⑩ IC3-4: PLAY
2V/div 50μS/div



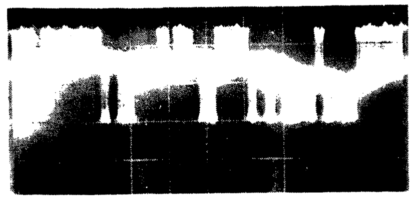
⑩ IC3-4: SEARCH
2V/div 100mS/div



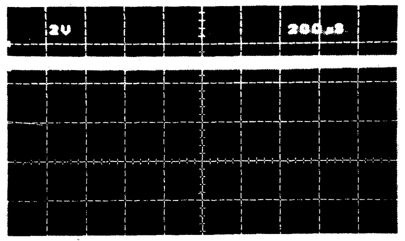
⑪ IC3-3: PLAY
2V/div 200μS/div



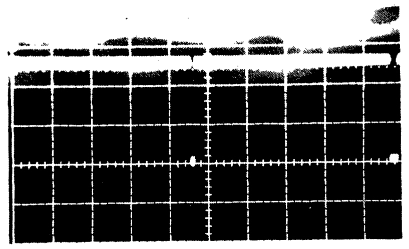
⑪ IC3-3: SEARCH
2V/div 10mS/div



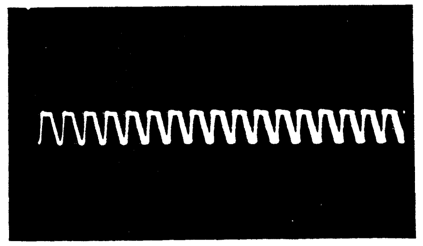
⑫ TP2-1: PLAY
2V/div 200μS/div



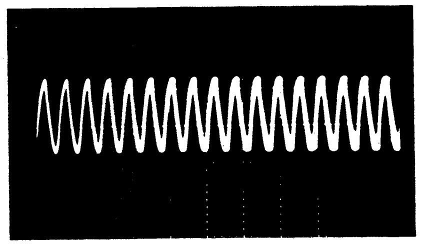
⑫ TP2-1: SEARCH
2V/div 20mS/div



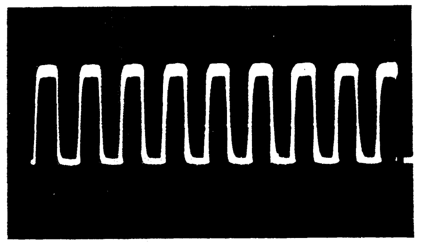
⑬ IC2-38: PLAY
2V/div 200μS/div



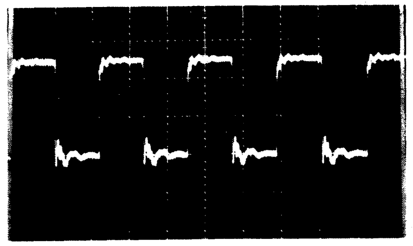
⑭ IC3-8: PLAY
2V/div 200μS/div



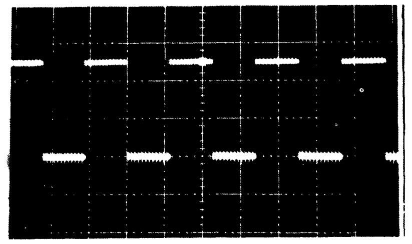
⑮ TP2-2: PLAY
2V/div 200μS/div



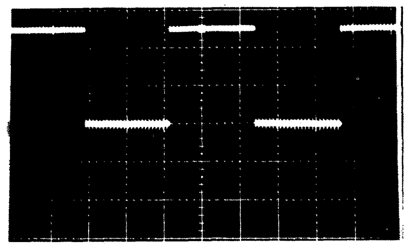
⑯ IC3-76: STOP
2V/div 200mS/div



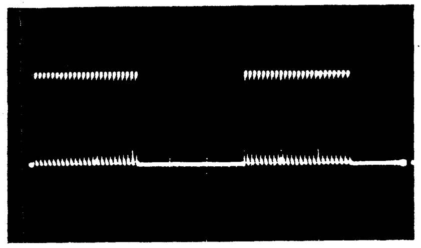
⑰ IC3-79: STOP
2V/div 5μS/div



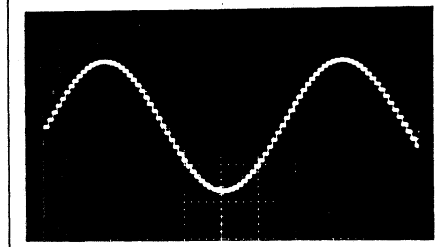
⑱ IC3-80: STOP
2V/div 5μS/div



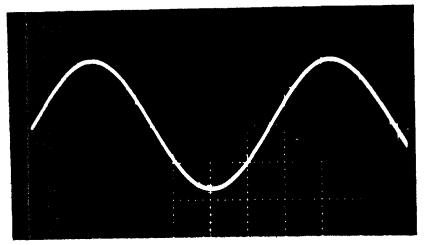
⑲ IC5-11: STOP
2V/div 1μS/div



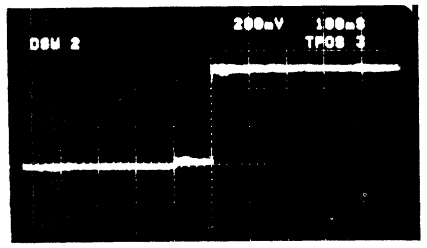
⑳ IC5-9: PLAY
2V/div 50μS/div



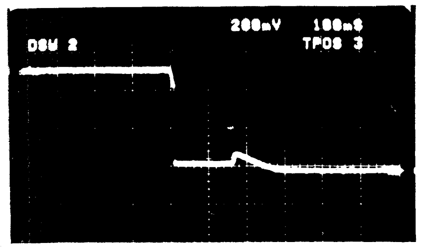
㉑ OUTPUT Lch: PLAY
2V/div 50μS/div



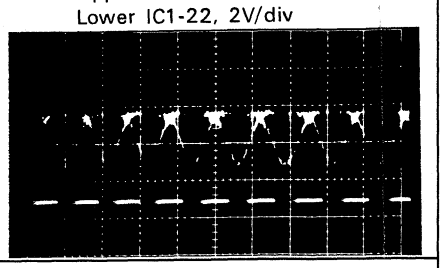
㉒ IC10-5: POWER ON
2V/div 100mS/div



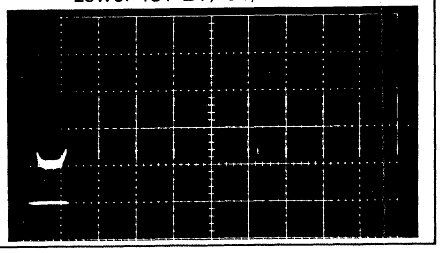
㉒ IC10-5: POWER-OFF
2V/div 100mS/div



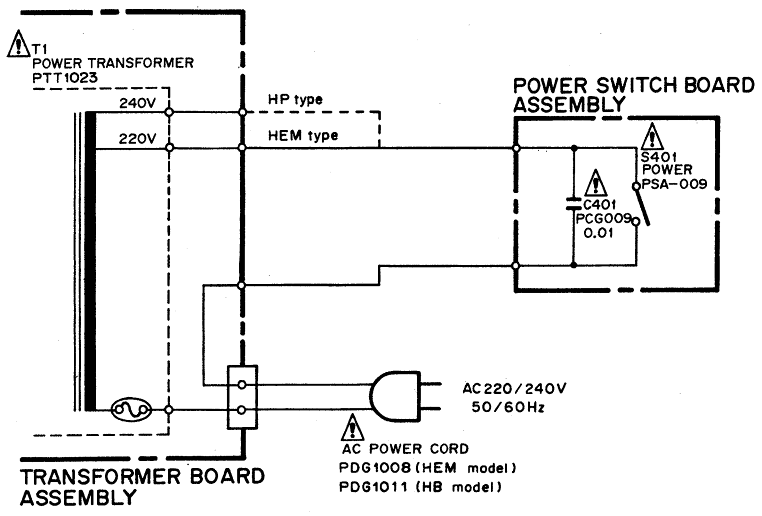
㉓ IC1-22: TR OPEN
1mS/div
Upper TP1-1, 1V/div
Lower IC1-22, 2V/div



㉔ IC1-21: DFCT
1mS/div
Upper TP1-1, 1V/div
Lower IC1-21, 5V/div



Schematic Diagram of HEM and HP types



Line Voltage Selection
(For HEM and HP types)

Line voltage can be changed with following steps.

1. Disconnect the AC Power cord.
2. Remove the Bonnet case.
3. Change the connection of the primary lead wires. (Connect as shown in Fig.)
4. Stick the line voltage label on the rear panel.

Description	Part No.
220V label	AAX-193
240V label	AAX-192

Exploded View and Parts List of PD-M40/KU type

NOTES:

- *Parts without part number cannot be supplied.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★ GENERALLY MOVES FASTER THAN ★
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
- *Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*

Parts of Exterior

Mark	No.	Part No.	Description
⚠ ⊙	1	PWZ1073	Main board assembly
⊙	2	PWZ1074	Control board assembly
⚠	3	CM-22C	Strain relief
⚠	4	PDG1002	AC Power cord
⚠ ★	5	PTT1022	Power transformer (AC120V)
	6	PBK1001	GND plate
	7	REC-369	Leg assembly
	8	·····	·····
	9	PAM1066	FL filter (KU,KC,HP and SD types)
		PAM1067	FL filter (HEM type)
	10	PAM1064	Phono name plate
	11	PAM1062	Display window
	12	PAM1065	Panel name plate
	13	PBH-456	Door spring
	14	PNW1146	Control panel
	15	PNA1107	Bonnet
	16	PAC1053	Function button
	17	PAC1097	Power button
	18	PAC1098	Eject button
	19	PAC1100	TRP button
	20	PAC1101	DISC button
	21	PAC1099	Operation button
	22	PNY-528	Power SW joint
	23	PYY1030	Door assembly
	24	BBZ30P060FMC	Screw
	25	BBZ30P060FZK	Screw

Mark	No.	Part No.	Description
	26	BBZ30P060FZK	Screw
	27	BBZ30P080FZK	Screw
	28	BBZ40P080FMC	Screw
	29	FBT40P080FZK	Screw
	30	IBZ30P060FCC	Screw
	31	IBZ30P150FCU	Screw
	32	IPZ30P060FMC	Screw
	33	PMZ30P060FMC	Screw
	34	PPZ30P080FMC	Screw
	35	PPZ30P080FMC	Screw
	101		Rear panel
	102		Base
	103		Angle
	104		SW angle
	105		Angle (C)
	106		Door name plate
	107		Cussion
	108		PCB spacer
	109		Multi machanism assembly
	110		Name plate
	111		Door
	112		Transformer board assembly

importance of the safety
arts of identical designa-

ated with the marks ★★

use it depends on model

ivery time may be longer

ription

N
N
N
N
N

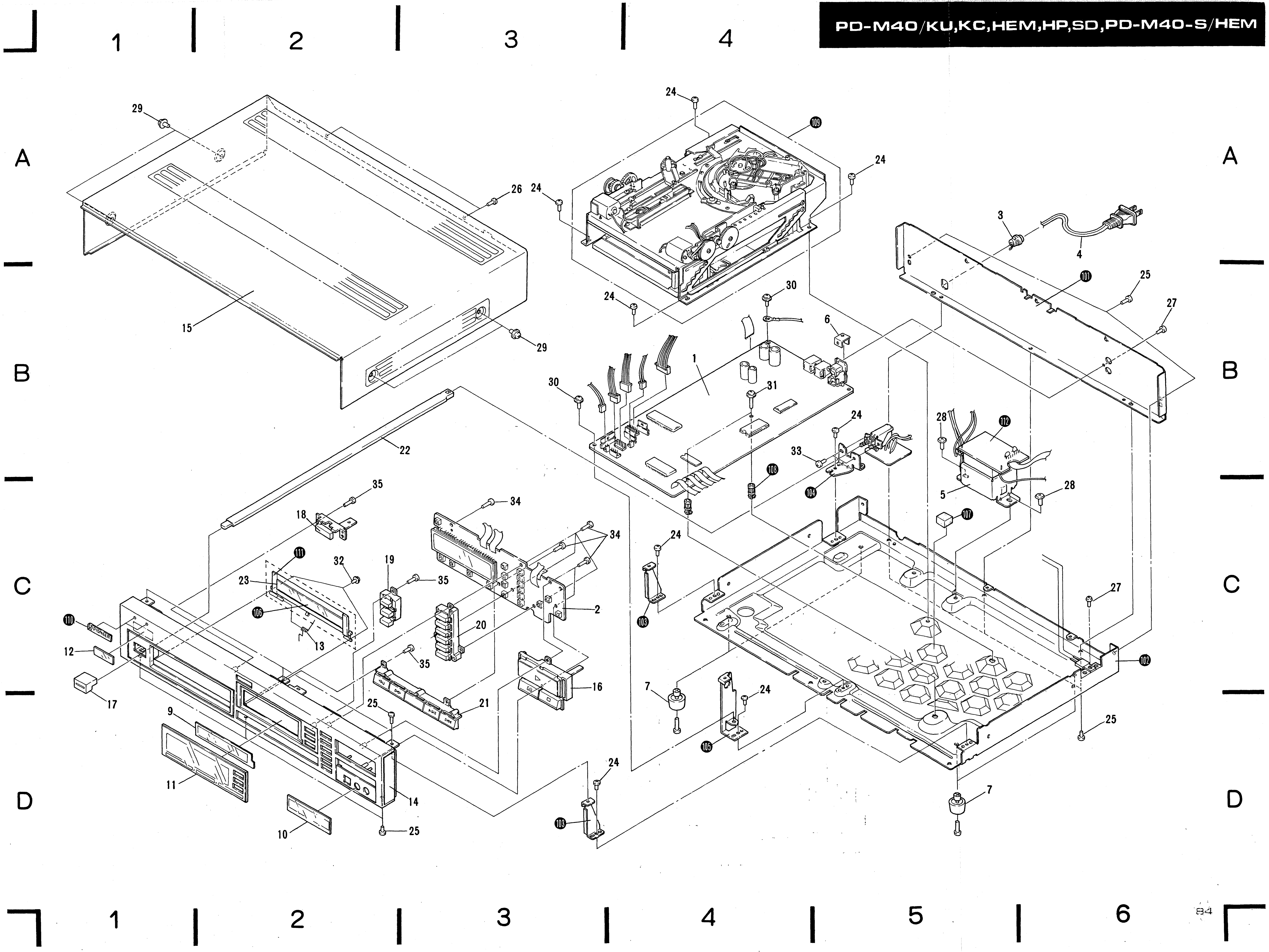
V
V
V
V
V

panel

ngle
(C)

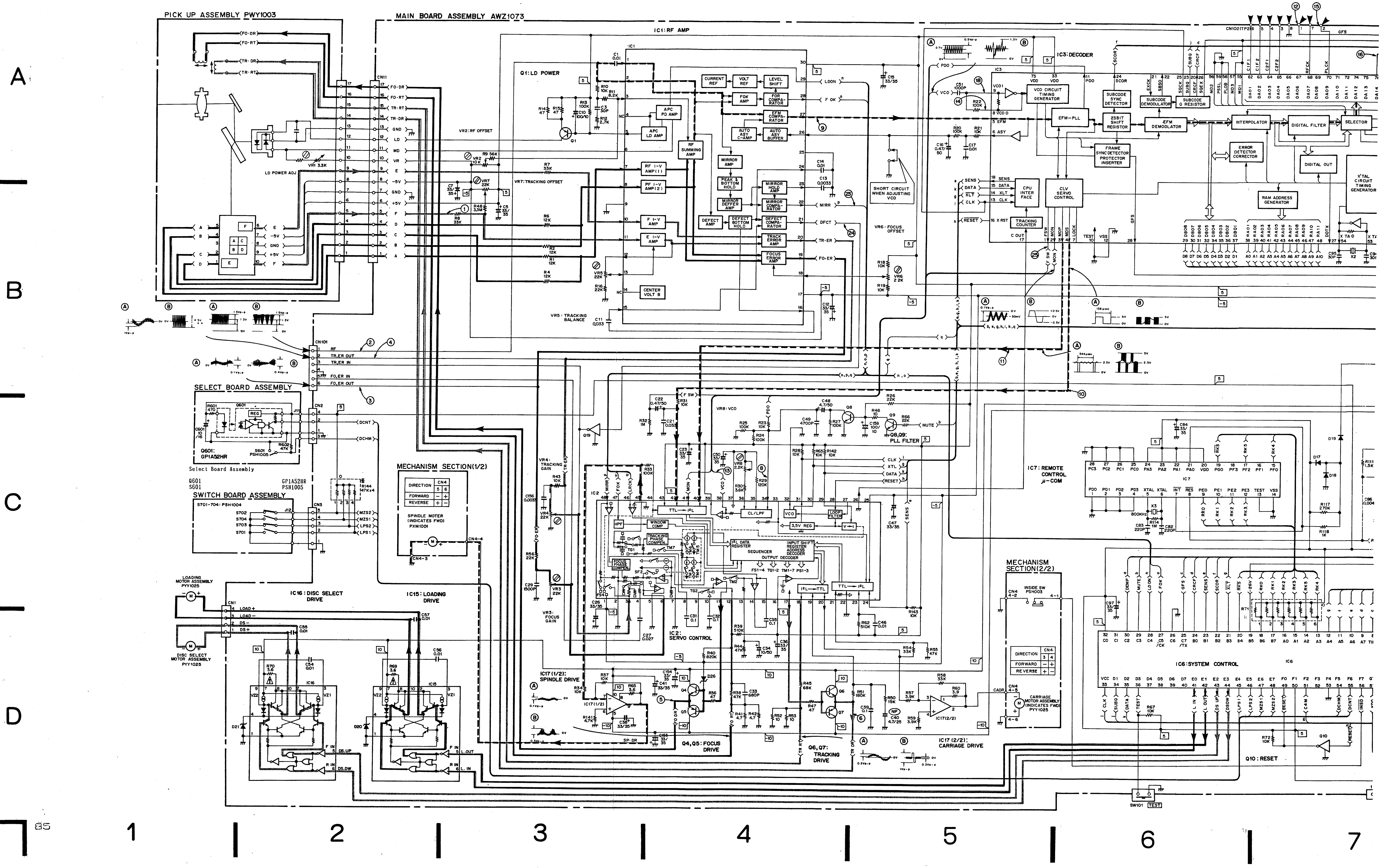
name plate
on
spacer
machanism assembly
plate

former board
nbly


1
2
3
4
5
6
A
B
C
D
1
2
3
4
5
6
7
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
101
102
103
104
105
106
107
108
109
110
111
112

PD-M40/KU,KC,HEM,HP,SD,PD-M40-S/HEM

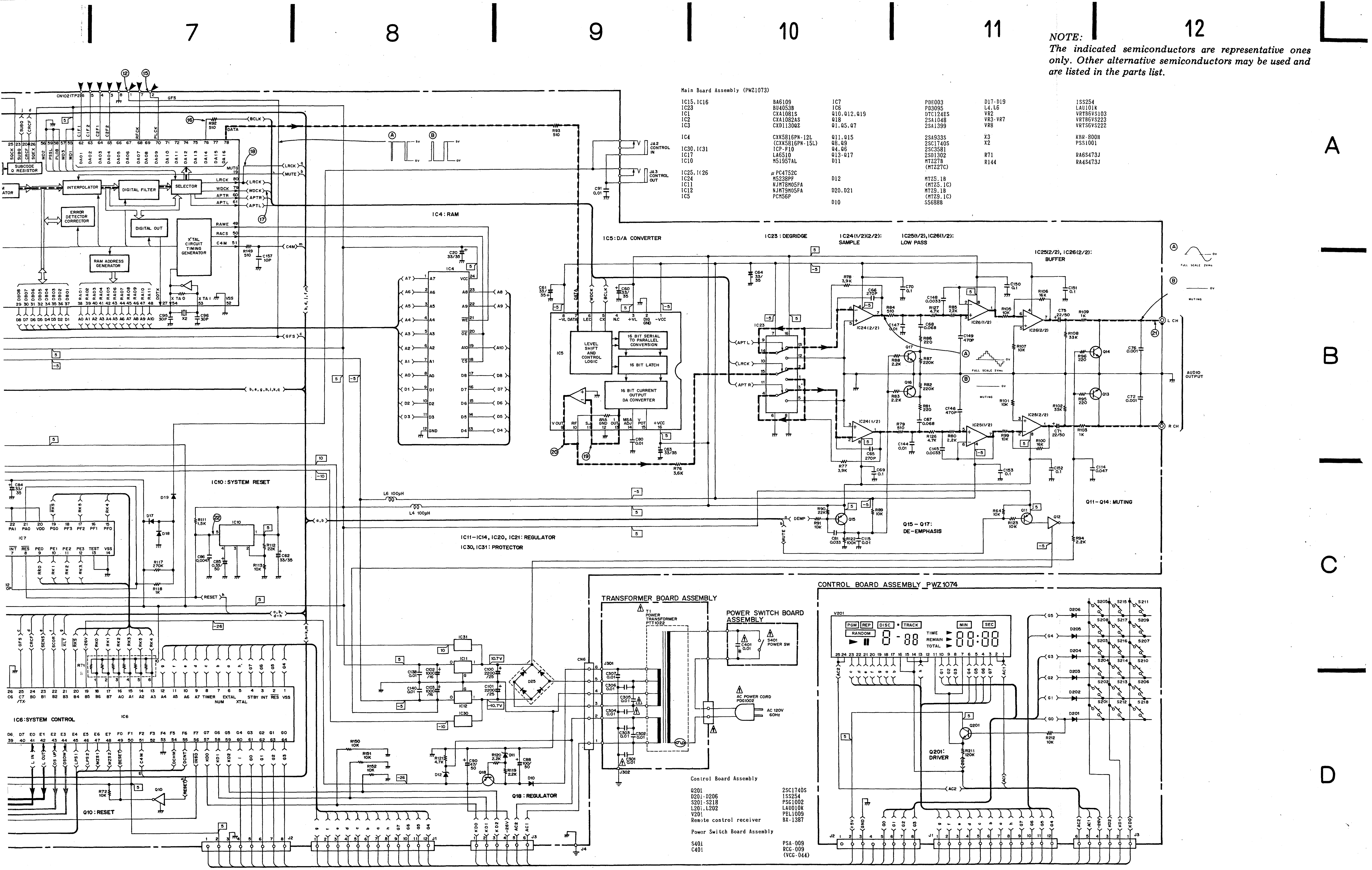
Schematic Diagram of PD-M40/KU type


3
4
5
6
7
A
B
C
D
1
2
PICK UP ASSEMBLY PWY1003
MAIN BOARD ASSEMBLY AWZ1073
IC1: RF AMP
Q1: LD POWER
LD POWER ADJ
VR1 3.3K
VR2: RF OFFSET
VR7: TRACKING OFFSET
VR5: TRACKING BALANCE
VR6: FOCUS OFFSET
APC PD AMP
APC LD AMP
RF SUMMING AMP
RF I-V AMP (1)
RF I-V AMP (2)
F I-V AMP
E I-V AMP
CENTER VOLT B
CURRENT REF
VOLT REF
LEVEL SHIFT
FOK AMP
FOK COMPARATOR
EFM COMPARATOR
AUTO ASY C-AMP
AUTO ASY BUFFER
MIRROR AMP
PEAK & BOTTOM HOLD
MIRROR DEFFER AMP
MIRROR HOLD AMP
MIRROR COMPARATOR
DEFECT AMP
DEFECT BOTTOM HOLD
DEFECT COMPARATOR
TRACK ERROR AMP
FOCUS ERROR AMP
SHORT CIRCUIT WHEN ADJUSTING VCO
IC3: DECODER
VCO CIRCUIT TIMING GENERATOR
EFM-PLL
SUBCODE SYNC DETECTOR
SUBCODE DEMODULATOR
SUBCODE Q RESISTOR
23BIT SHIFT REGISTOR
EFM DEMODULATOR
FRAME SYNC DETECTOR PROTECTOR INSERTER
CPU INTER FACE
CLV SERVO CONTROL
TRACKING COUNTER
INTERPOLATOR
DIGITAL FILTER
SELECTOR
ERROR DETECTOR CORRECTOR
DIGITAL OUT
RAM ADDRESS GENERATOR
X'TAL CIRCUIT TIMING GENERATOR
CN101
RF
TR.ER OUT
TR.ER IN
FO.ER IN
FO.ER OUT
SELECT BOARD ASSEMBLY
Q601: GP1A52HR
Select Board Assembly
Q601 GP1A52HR
S601 PSH1005
SWITCH BOARD ASSEMBLY
S701-704: PSH1004
MECHANISM SECTION(1/2)
DIRECTION
FORWARD
REVERSE
SPINDLE MOTER (INDICATES FWD) PXM1001
VR8: VCO
Q8,Q9: PLL FILTER
VR4: TRACKING GAIN
VR3: FOCUS GAIN
IC2: SERVO CONTROL
WINDOW COMP
TRACKING PHASE COMPEN.
FOCUS PHASE COMPEN.
I²L DATA REGISTER
SEQUENCER
INPUT SHIFT REGISTER ADDRESS DECODER
OUTPUT DECODER
IC7: REMOTE CONTROL µ-COM
MECHANISM SECTION(2/2)
INSIDE SW PSH003
CARRIAGE MOTOR ASSEMBLY (INDICATES FWD) PYY1025
IC6: SYSTEM CONTROL
Q10: RESET
SW101 TEST
LOADING MOTOR ASSEMBLY PYY1025
DISC SELECT MOTOR ASSEMBLY PYY1025
IC16: DISC SELECT DRIVE
IC15: LOADING DRIVE
IC17(1/2): SPINDLE DRIVE
Q4,Q5: FOCUS DRIVE
Q6,Q7: TRACKING DRIVE
IC17 (2/2): CARRIAGE DRIVE
MUTE
DCNT
DCHM
MZS2
MZS1
LPS2
LPS1
LOAD+
LOAD−
DS−
DS+
FO·DR
FO·RT
TR·DR
TR·RT

NOTE:
The indicated semiconductors are representative ones only. Other alternative semiconductors may be used and are listed in the parts list.

Main Board Assembly (PWZ1073)

IC15, IC16	BA6109	IC7	PDE003	D17-D19	1SS254
IC23	BU4053B	IC6	PD3095	L4, L6	LAU101K
IC1	CXA1081S	Q10, Q12, Q19	DTC124ES	VR2	VRTB6VS103
IC2	CXA1082AS	Q18	2SA1048	VR3-VR7	VRTB6VS223
IC3	CXD1130QZ	Q1, Q5, Q7	2SA1399	VR8	VRTS6VS222
IC4	CXK5816PN-12L	Q11, Q15	2SA933S	X3	KBR-800H
	(CXK5816PN-15L)	Q8, Q9	2SC1740S	X2	PSS1001
IC30, IC31	ICP-F10	Q4, Q6	2SC3581		
IC17	LA6510	Q13-Q17	2SD1302	R71	RA6S473J
IC10	M51957AL	D11	MTZ27B	R144	RA4S473J
			(MTZ27C)		
IC25, IC26	μPC4752C				
IC24	M5238PF	D12	MTZ5.1B		
IC11	NJM78M05FA		(MTZ5.1C)		
IC12	NJM79M05FA	D20, D21	MTZ9.1B		
IC5	PCM56P		(MTZ9.1C)		
		D10	S5688B		


7
8
9
10
11
12
A
B
C
D
CN102(TP2)
SUBCODE Q RESISTOR
INTERPOLATOR
DIGITAL FILTER
SELECTOR
ERROR DETECTOR CORRECTOR
DIGITAL OUT
X'TAL CIRCUIT TIMING GENERATOR
RAM ADDRESS GENERATOR
IC4 : RAM
IC5 : D/A CONVERTER
LEVEL SHIFT AND CONTROL LOGIC
16 BIT SERIAL TO PARALLEL CONVERSION
16 BIT LATCH
16 BIT CURRENT OUTPUT DA CONVERTER
IC23 : DEGRIDGE
IC24(1/2)(2/2): SAMPLE
IC25(1/2), IC26(1/2): LOW PASS
IC25(2/2), IC26(2/2): BUFFER
JA2 CONTROL IN
JA3 CONTROL OUT
L CH
R CH
AUDIO OUTPUT
FULL SCALE 2VMS
MUTING
Q11-Q14 : MUTING
Q15-Q17: DE-EMPHASIS
DEMP
MUTE
IC10 : SYSTEM RESET
IC11-IC14, IC20, IC21: REGULATOR
IC30, IC31: PROTECTOR
IC6 : SYSTEM CONTROL
IC7
Q10 : RESET
Q18 : REGULATOR
TRANSFORMER BOARD ASSEMBLY
T1 POWER TRANSFORMER PTT1022
POWER SWITCH BOARD ASSEMBLY
S401 POWER SW
AC POWER CORD PDG1002
AC 120V 60Hz
CONTROL BOARD ASSEMBLY PWZ1074
V201
PGM
REP
DISC
TRACK
RANDOM
MIN
SEC
TIME
REMAIN
TOTAL
Q201: DRIVER
J1
J2
J3
J4
CN6
J301
J302

Control Board Assembly

Q201	2SC1740S
D201-D206	1SS254
S201-S218	PSG1002
L201, L202	LAU010K
V201	PEL1009
Remote control receiver	BX-1387

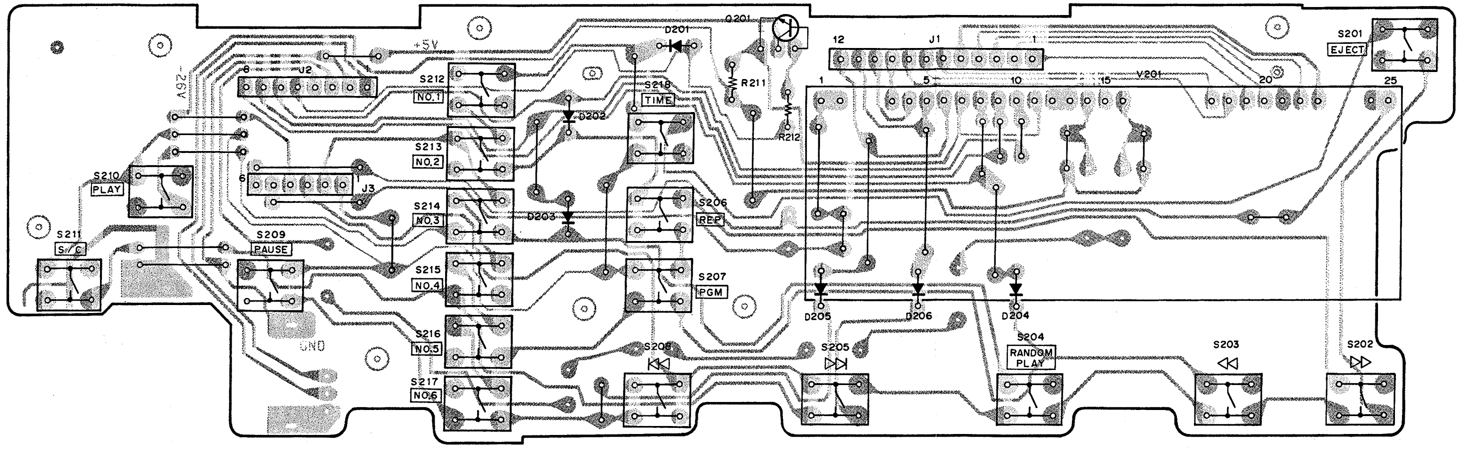
Power Switch Board Assembly

S401	PSA-009
C401	RCG-009
	(VCG-044)

P. C. Board Patterns of PD-M40

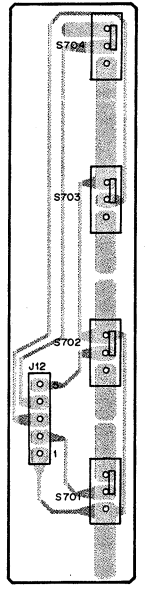
Note: P. C. Board connections of PD-M40 are the same as PD-M50.
Refer to PD-M50.

CONTROL BOARD ASSEMBLY PWZ1074



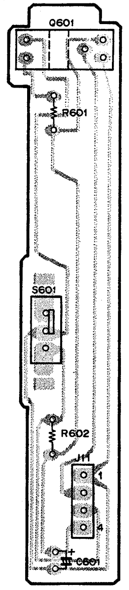
S201
EJECT
J1
J2
J3
V201
Q201
D201
D202
D203
D204
D205
D206
R211
R212
+5V
GND
S210
PLAY
S211
S/C
S209
PAUSE
S212
NO.1
S213
NO.2
S214
NO.3
S215
NO.4
S216
NO.5
S217
NO.6
S218
TIME
S206
REP
S207
PGM
S208
S205
S204
RANDOM PLAY
S203
S202

SWITCH BOARD ASSEMBLY



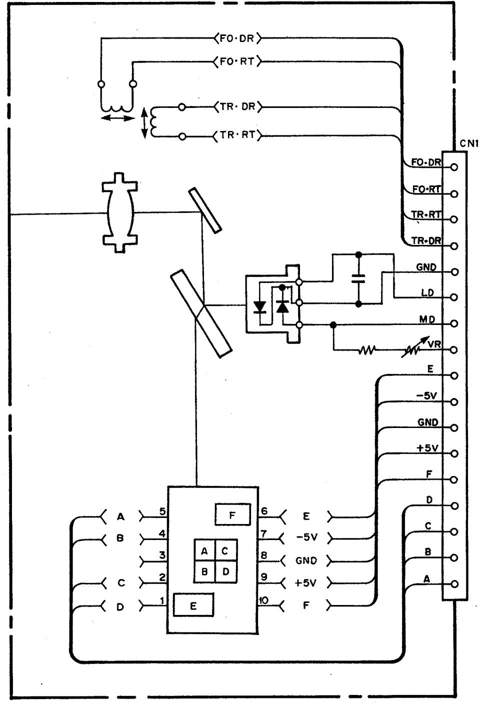
S704
S703
S702
S701
J12

SELECT BOARD ASSEMBLY



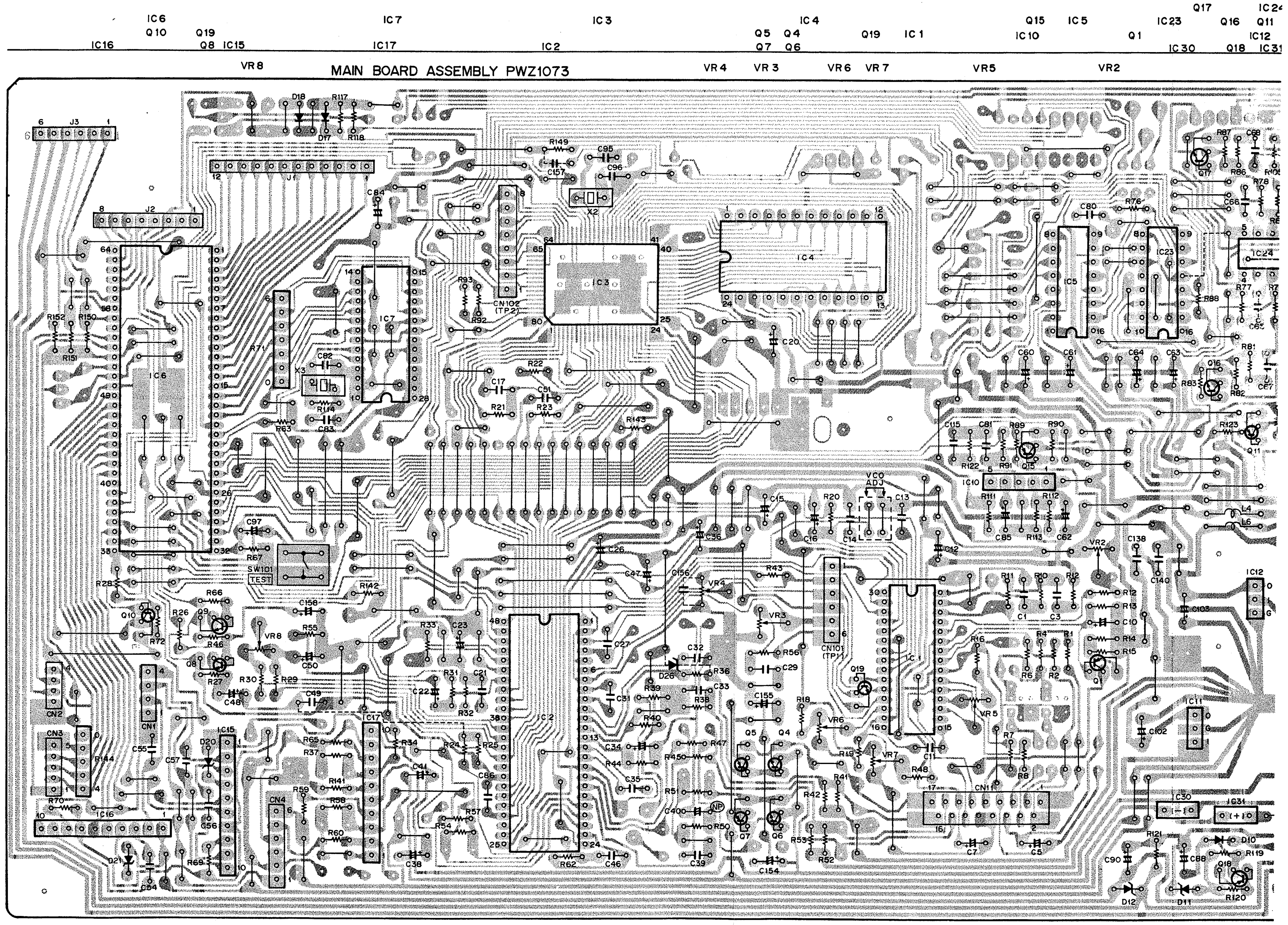
Q601
R601
S601
R602
J11
C601

PICK UP ASSEMBLY PWY1003



FO·DR
FO·RT
TR·DR
TR·RT
CN11
FO·DR
FO·RT
TR·RT
TR·DR
GND
LD
MD
VR
E
-5V
GND
+5V
F
D
C
B
A
A
B
C
D
E
F
-5V
GND
+5V
F

MAIN BOARD ASSEMBLY PWZ1073

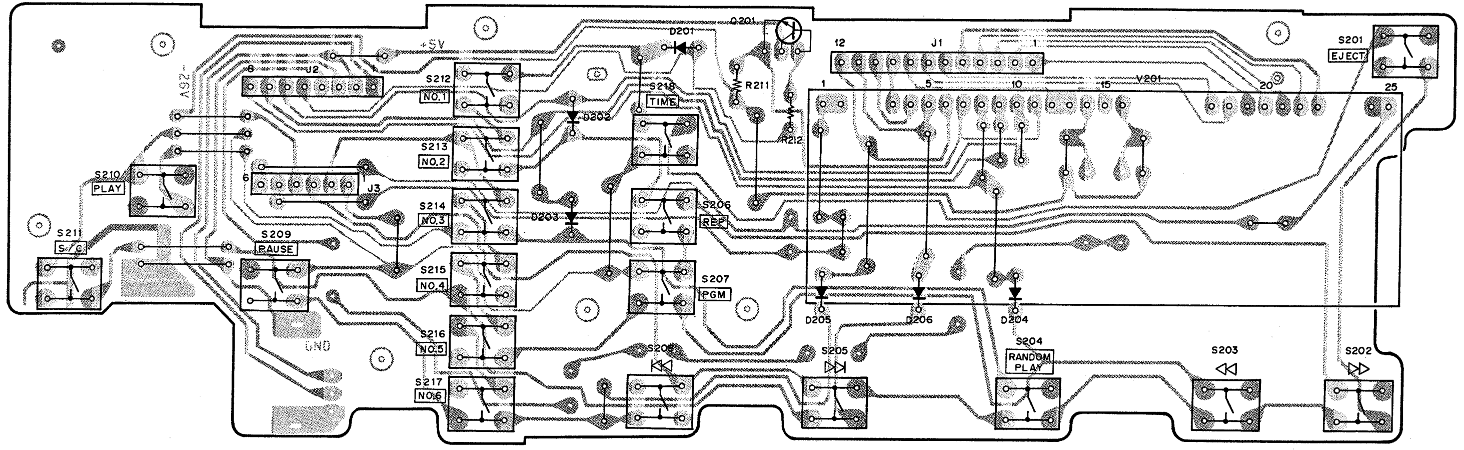


IC16
IC6
Q10
Q19
Q8
IC15
IC7
IC17
IC3
IC2
Q5
Q7
Q4
Q6
IC4
Q19
IC1
Q15
IC10
IC5
Q1
IC23
IC30
Q17
Q16
Q18
Q11
IC12
VR8
VR4
VR3
VR6
VR7
VR5
VR2
J3
J2
J1
CN102
(TP2)
CN101
(TP1)
X2
X3
VCO ADJ
SW101
TEST
CN1
CN2
CN3
CN4
CN11
IC11
L4
L6
D10
D11
D12
D20
D21
D26

4 5 6 7

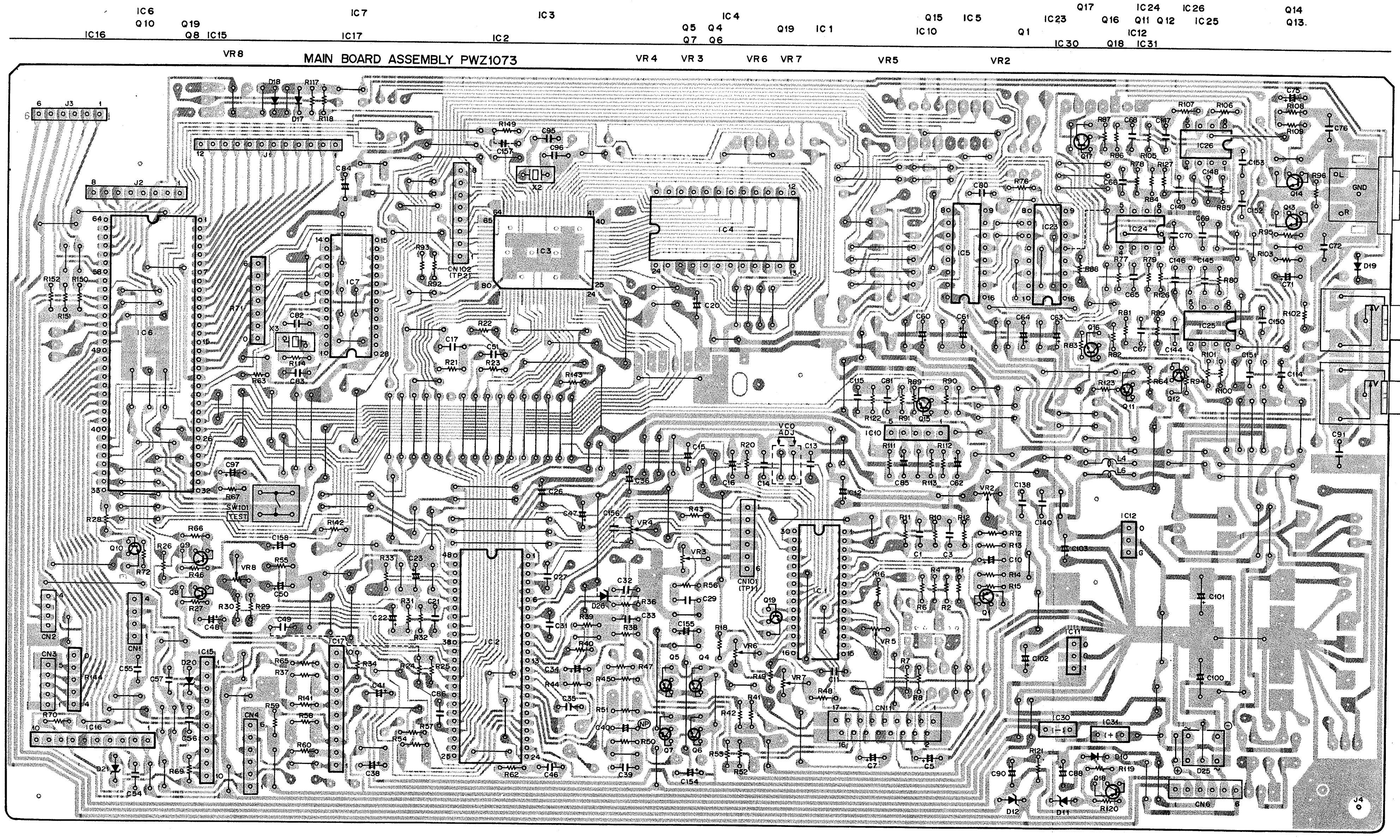
A

CONTROL BOARD ASSEMBLY PWZ1074


S212 NO.1
S213 NO.2
S214 NO.3
S215 NO.4
S216 NO.5
S217 NO.6
S210 PLAY
S211 S/C
S209 PAUSE
S218 TIME
S206 REP
S207 PGM
S205
S204 RANDOM PLAY
S203
S202
S201 EJECT
Q201
D201
D202
D203
D204
D205
D206
R211
R212
J1
J2
J3
V201
+5V
GND

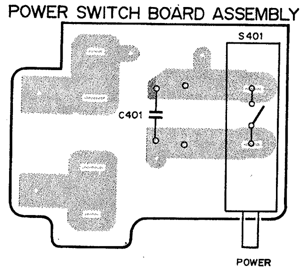
B

MAIN BOARD ASSEMBLY PWZ1073


IC16
IC6
Q10
Q19
Q8
IC15
VR8
IC17
IC7
IC2
IC3
Q5
Q7
Q4
Q6
IC4
VR4
VR3
VR6
VR7
Q19
IC1
VR5
Q15
IC10
IC5
Q1
VR2
IC23
IC30
Q17
Q16
Q18
IC24
Q11
Q12
IC12
IC31
IC26
IC25
Q14
Q13
JA1 AUDIO OUTPUT
JA2 CONTROL IN
JA3 CONTROL OUT
VCO ADJ
SW101 TEST
CN101 (TP1)
CN102 (TP2)
X2
X3
L4
L6
J4
CN1
CN2
CN3
CN4
CN6
CN11

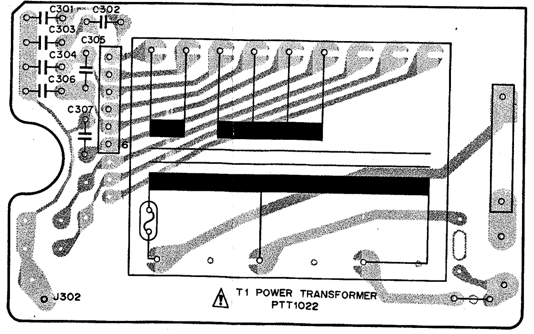
C

POWER SWITCH BOARD ASSEMBLY


S401
C401
POWER

D

TRANSFORMER BOARD ASSEMBLY


C301
C302
C303
C304
C305
C306
C307
J302
⚠ T1 POWER TRANSFORMER PTT1022

4 5 6 7 8 9

215 : 4 (DISC No.)
216 : 5 (DISC No.)
217 : 6 (DISC No.)
218 : TIME

VER SWITCH BOARD ASSEMBLY
401 : POWER ON - OFF
ECT BOARD ASSEMBLY
601 : DISC SELECTOR ON - OFF
(HOME POSITION SW) (HOME POSITION – OUTSIDE OF HOME POSITION)

HANISM BOARD ASSEMBLY
O1 (LPS1) : } LOAD POSITION SW
O2 (LPS2) :

	STOP	During the loading	Clamp condition PLAY	during the eject
S701	ON (H)	OFF (L)	OFF (L)	ON (H)
S702	ON (H)	ON (H)	OFF (L)	OFF (L)

O3 (MZS2) : } MAGAZINE DISCRIMINATE SW
O4 (MZS1) :

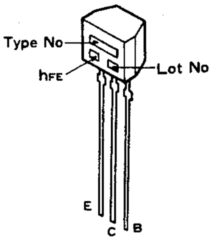
	NO MAGAZINE	SIX MAGAZINE	SINGLE
S703	ON (H)	OFF (L)	OFF (L)
S704	OFF (L)	ON (H)	OFF (L)

e underlined indicates the switch position.

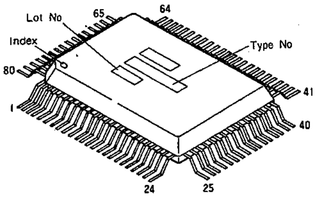
VEFORMS:
—PLAY mode. Ⓑ—SERCH mode.
oltages and time values are general guide only.

External Appearance of Transistors and ICs

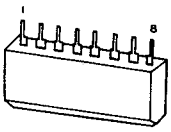
2SA1048


Type No
hFE
Lot No
E
C
B

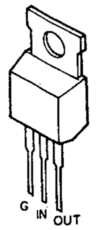
CXD1135Q


Lot No
65
64
Index
Type No
80
1
41
40
24
25

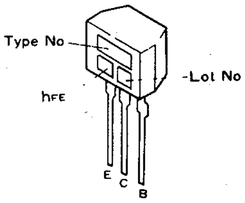
M5218L



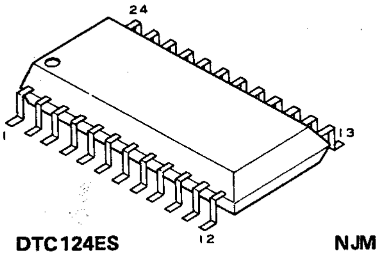
NJM79M05FA



2SA933S
2SC1740S


Type No
hFE
Lot No
E
C
B

CXK5816PN-12L
CXK5816PN-15L



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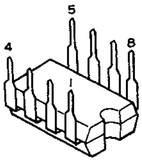

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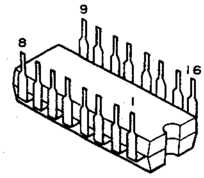

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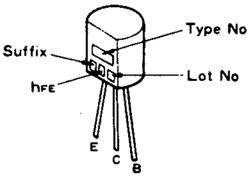
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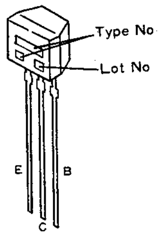
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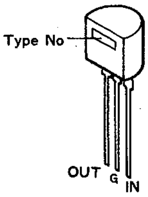
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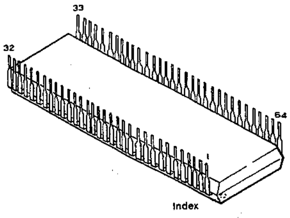
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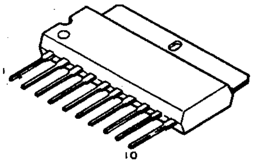

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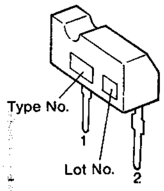
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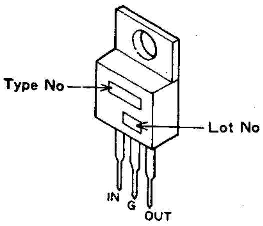
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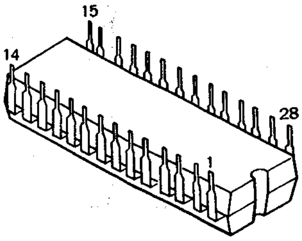

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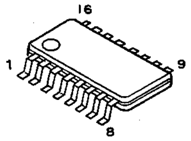

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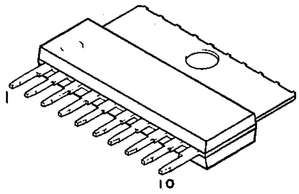

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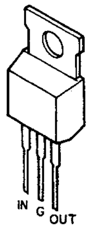

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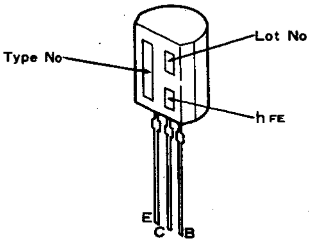
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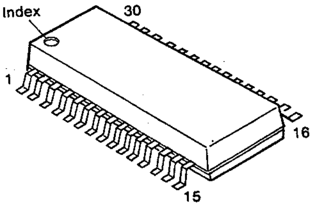
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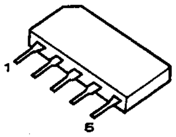

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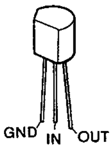


9. ELECTRICAL PARTS LIST

NOTES:

- *Parts without part number cannot be supplied.*
- *Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★ GENERALLY MOVES FASTER THAN ★
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
- *When ordering resistors, first convert resistance values into code form as shown in the following examples.*
  Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).
  560Ω　56×10^1　561..........................RD1/4PS$\boxed{5}\,\boxed{6}\,\boxed{1}$ J
  47kΩ　47×10^3　473..........................RD1/4PS$\boxed{4}\,\boxed{7}\,\boxed{3}$ J
  0.5Ω　0R5..RN2H$\boxed{0}\,\boxed{R}\,\boxed{5}$ K
  1Ω　010...RS1P$\boxed{0}\,\boxed{1}\,\boxed{0}$ K

  Ex. 2 When there are 3 effective digits (such as in high precision metal film resistors).
  5.62kΩ　562×10^1　5621........................RN1/4SR$\boxed{5}\,\boxed{6}\,\boxed{2}\,\boxed{1}$ F

Miscellaneous Parts

P.C. BOARD ASSEMBLIES

Mark	Symbol & Description	Part No.
⚠ ⊙	Main board assembly	PWZ1159
⊙	Control board assembly	PWZ1160
⚠	Power switch board assmbly	
⚠	Transformer board assembly	
	Headphone board assembly	
	Switch board assembly	
	Select board assmebly	

OTHERS

Mark	Symbol & Description	Part No.
⚠	Strain relief	CM-22C
⚠	AC Power cord	PDG1002 (PDG1015)
★★	Motor assembly (DISC SELECT, DISC LOADING CARRIAGE)	PYY1025
★★	Spindle motor	PXM1001
★★	Remote control unit	PWW1008
	Pick up assembly	PWY1003
★★	Slide switch (INSIDE SW)	PSH1003

⊙ Main Board Assembly (PWZ1159)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★	IC15, IC16	BA6109
★★	IC23	BU4053B
★★	IC1	CXA1081S
★★	IC2	CXA1082AS
★★	IC3	CXD1135QZ
★★	IC4	CXK5816PN-12L (CXK5816PN-15L)
⚠ ★★	IC30, IC31	ICP-F10
⚠ ★★	IC17	LA6510
★★	IC10	M51957AL
★★	IC24, IC25, IC26	M5238PF
★★	IC20	NJM78L05A
★★	IC13	NJM78L12A
⚠ ★★	IC11	NJM78M05FA
★★	IC21	NJM79L05A
★★	IC14	NJM79L12A
⚠ ★★	IC12	NJM79M05FA
★★	IC5	PCM56P-J
★★	IC7	PDE003
★★	IC6	PD3095
★★	Q10, Q12, Q19	DTC124ES
★★	Q18	2SA1048
★★	Q1, Q5, Q7	2SA1399
★★	Q11, Q15	2SA933S
★★	Q8, Q9,	2SC1740S
★★	Q4, Q6	2SC3581
★★	Q13, Q14, Q16, Q17	2SD1302
★	D11	MTZ27B (MTZ27C)
★	D12	MTZ5.1B (MTZ5.1C)
★	D20, D21	MTZ9.1B (MTZ9.1C)
★	D5—D8, D10	S5688B
★	D26	MTZ7.5A (MTZ7.5B)
★	D25	WL02-5004

COILS

Mark	Symbol & Description	Part No.
	L2, L3	LAU010K

SWITCH

Mark	Symbol & Description	Part No.
★★	SW101 Tact switch (TEST MODE SW)	PSG1002

CAPACITORS

Mark	Symbol & Description	Part No.
	C95, C96, C3	CCCCH300J50
	C82, C83	CCCSL221J50
	C40	CEANP4R7M25
	C85	CEASR33M50
	C49	CQMA472K50
	C157	CCCSL100D50
	C16, C22	CEASR47M50
	C34	CEAS100M50
	C10, C158	CEAS101M10
	C88	CEAS101M50
	C102, C103	CEAS102M16
	C146, C149	CQMA471J50
	C104, C105	CEAS102M25
	C71, C75	CEAS220M50
	C100, C101	CEAS222M25
	C5, C7, C12, C15, C20, C23, C26, C36, C38, C41, C47, C50, C60—C64, C84, C97 C154, C155	CEAS330M35
	C48	CEAS4R7M50
	C90	CEAS470M50
	C111, C112	CEAS471M16
	C106, C107	CEAS471M25
	C54—C57, C115, C138, C140	CKCYF103Z50
	C145, C148, C156	CQMA332J50
	C86, C114	CKCYF473Z50
	C51	CQMA102K50
	C1, C13, C17, C46, C80	CQMA103K50
	C14, C31, C32, C35, C39, C69, C70, C150—C153	CQMA104K50
	C29	CQMA152J50
	C21, C81	CQMA333K50
	C27	CQMA153K50
	C33	CQMA681K50
	C67, C68	CFTXA683J50
	C11	CQMA273J50
	C72, C76	CQSA102J50
	C65, C66	CQSA331J50
	C144, C147	CFTXA103J50

RESISTORS

Mark	Symbol & Description	Part No.
	R144	RA4S473J
	R71	RA6S473J
	R30	RN1/6PQ3601F
★	VR2 (Semi-fixed)	VRTB6VS103
★	VR3—VR7 (Semi-fixed)	VRTB6VS223
★	VR8 (Semi-fixed)	VRT6VS222
	Other resistors	RD1/6PM☐☐☐J

OTHERS

Mark	Symbol & Description	Part No.
	JA1 2P pin jack (AUDIO OUTPUT)	VKB-006
★	X2 Ceramic resonator	KBR-800H
★	X3 Crystal sesonator	PSS-012

Mark	Symbol & Description	Part No.
	DL1, DL2	PTF1009

⊙ Control Board Assmebly (PWZ1160)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★	Q201	2SC1740S
★	D201—D206	1SS254

SWITCHES

Mark	Symbol & Description	Part No.
★★	S201—S218 Tact switch EJECT, MANUAL SEARCH (◀◀), MANUAL SEARCH (▶▶), RANDOM PLAY, TRACK SERCH (⏮), REPEAT, PGM MEMORY, TRACK SEARCH (⏭), PAUSE, PLAY, S/C, 1 (TRACK No., DISC No.), 2 (TRACK No., DISC No.), 3 (TRACK No., DISC No.), 4 (TRACK No., DISC No.), 5 (TRACK No., DISC No.), 6 (TRACK No., DISC No.), TIME	PSG1002

COILS

Mark	Symbol & Description	Part No.
	L201, L202 (1 μH)	LAU010K

CAPACITOR

Mark	Symbol & Description	Part No.
	C201	CKPUYF103Z25

RESISTORS

Mark	Symbol & Description	Part No.
	R212	RD1/6PM103J
	R211	RD1/6PM124J

OTHERS

Mark	Symbol & Description	Part No.
	V201 Fluoresent indicator	PEL1009
	Remote control receiver	BX-1387

Power Switch Board Assembly

SWITCH

Mark	Symbol & Description	Part No.
★★	S401 Power switch (POWER)	PSA-009

CAPACITOR

Mark	Symbol & Description	Part No.
	C401 (0.01 μF/AC400V)	RCG-009 (VCG-044)

Transformer Board Assembly

Transformer

Mark	Symbol & Description	Part No.
⚠ ★	T1 Power transformer (AC120V)	PTT1026

CAPACITORS

Mark	Symbol & Description	Part No.
⚠	C301, C304, C305, C309, C310	CKCYF103Z50
	C302, C303, C306—C308	CKCYF103Z50

Headphone Board Assembly

SEMICONDUCTOR

Mark	Symbol & Description	Part No.
★★	IC501	M5218L

CAPACITORS

Mark	Symbol & Description	Part No.
	C501—C503	CKCYF473Z50
	C504, C505	CQMA104K50

RESISTORS

Mark	Symbol & Description	Part No.
★	VR501 Variable resistor (PHONES LEVEL 20K)	PCS1001
	Other resistors	RD1/6PM□□□J

OTHER

Mark	Symbol & Description	Part No.
	JA301 Jack (PHONES)	PKN1001

Switch Board Assembly

SWITCHES

Mark	Symbol & Description	Part No.
★★	S701—S704 Slide switch	PSH1004

Select Board Assembly

SEMICONDUCTOR

Mark	Symbol & Description	Part No.
★★	Q601	GP1A52HR

SWITCH

Mark	Symbol & Description	Part No.
★★	S601 Slide switch (MODE)	PSH1005

CAPACITOR

Mark	Symbol & Description	Part No.
	C601	CEAL100M16

RESISTORS

Mark	Symbol & Description	Part No.
	All resistors	RD1/6PM□□□J

10. ADJUSTMENTS

The adjustment items of this model should be performed in the order as shown below.

• Adjustment Items

1. Tracking error offset, focus offset and RF offset adjustments
2. LD (Laser Diode) output power confirmation
3. Focus lock and spindle lock confirmation
4. Grating adjustment
5. Tracking balance adjustment
6. Tangential adjustment
7. RF level confirmation
8. Focus gain adjustment
9. Tracking gain adjustment
10. VCO free-run frequency adjustment

• Measuring Equipment

1. Dual trace oscilloscope
2. Laser power meter
3. Test disc (YEDS7)
4. Tracking balance adjustment filter
5. Loop gain adjustment filter
6. Signal generator
7. Frequency counter
8. Other general tools

• Test Mode

All the adjustments should be performed in Test Mode.

Test Mode setting and cancellation procedures

(1) To set the Test Mode, turn the POWER switch of the player (SW101) ON pushing the TEST MODE SWITCH.

(2) To cancel the Test Mode, simply turn the POWER switch of the player OFF.

The various key functions in the Test Mode are listed in Table 10-1.

• Adjusting Points

VR1: Laser power
VR7: Tracking offset (TRK.OFS)
VR3: Focus gain (FCS.GAN)
VR4: Tracking gain (TRK.GAN)
VR5: Tracking balance (TRK.BAL)
VR6: Focus offset (FCS.OFS)
VR8: VCO adjustment (VCO.ADJ)
VR2: RF offset (RF.OFS)

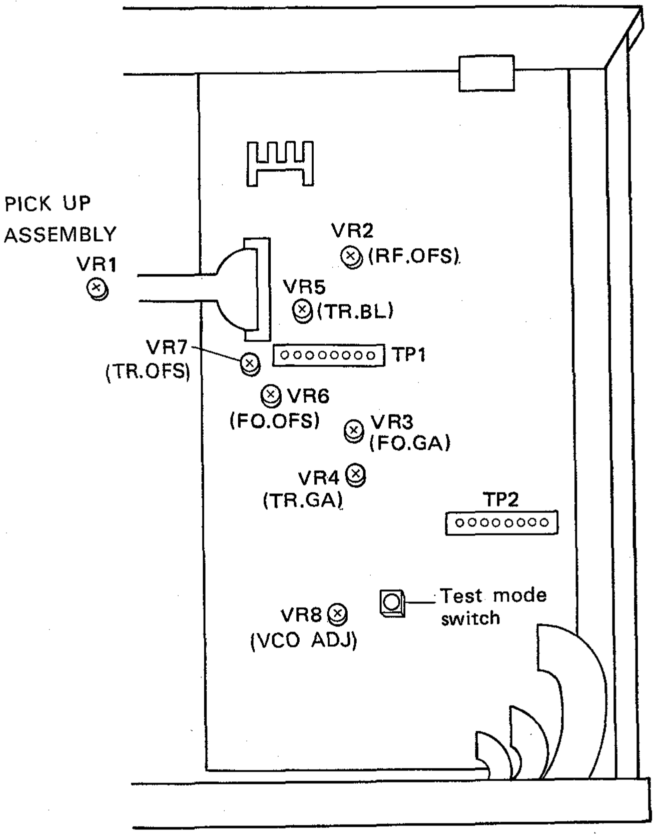
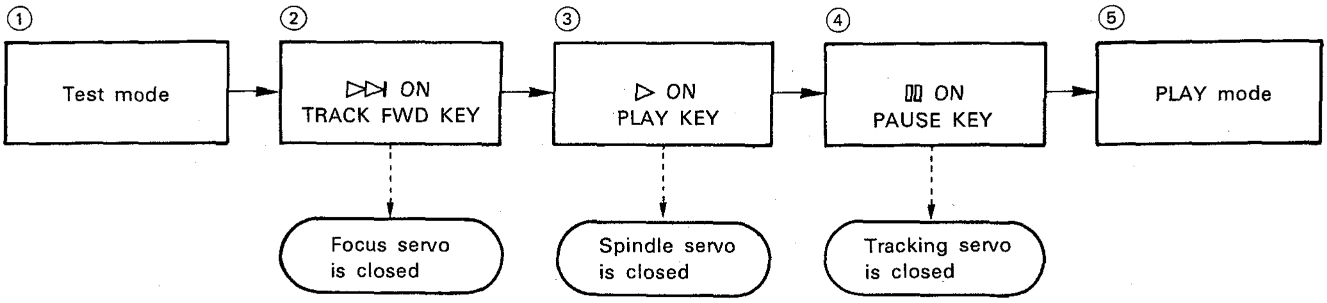


Fig. 10-1 Adjusting point

In the Test Mode, each servo circuit can be closed and opened by separate operations. Consequently, each servo must be closed one at a time (in serial sequence) to set PLAY mode.
Note that PLAY mode is not activated by simply pressing the PAUSE key (▯▯) in the Test Mode.

Example: Switching from STOP to PLAY mode.

* The each servo mechanisms operate in a serial sequence in the Test Mode.

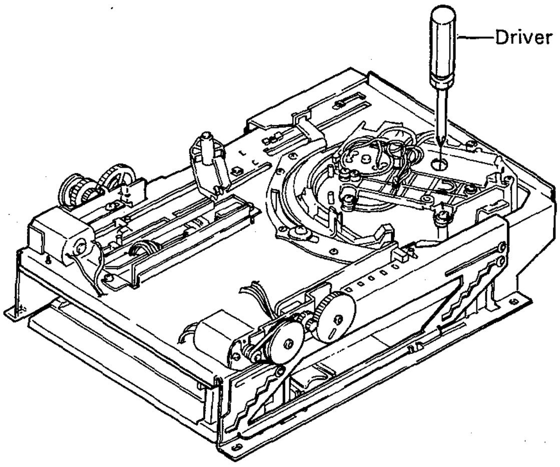
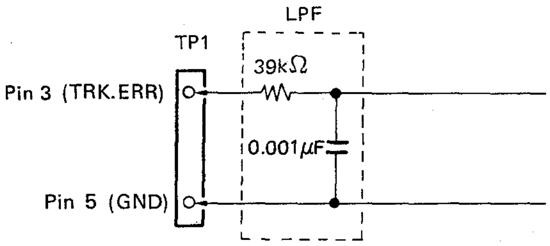


• Key Functions in Test Mode

Symbol	Key name	Function during test mode	Description
⏮	TRACK BACK	Laser diode turned ON.	Laser diode lights up.
⏭	TRACK FWD	Focus servo is closed.	Laser diode lights up. Actuator is moved up/down, then focus servo is closed.
▷	PLAY	Spindle servo is closed.	Spindle starts to rotate and the servo is closed when it turns into the CLV-A servo mode.
▯▯	PAUSE	Tracking servo is closed/opened.	Performs toggle operation. Closing the tracking servo and becomes PLAY mode by depressing the key (Focus servo and spindle servo must be closing), and PAUSE indicator lights up. Tracking servo opens by depressing the key again.
◁◁	MANUAL SEARCH REV	Carriage moves in reverse direction. (towards disc center)	Carriage is moved towards disc center at a fast speed of about 3 cm/sec. Since there is no safety mechanism to stop the carriage, release the key when the carriage reaches the end.
▷▷	MANUAL SEARCH FWD	Carriage moves in forward direction. (towards disc end)	Carriage is moved towards disc end at a fast speed of about 3 cm/sec. Since there is no safety mechanism to stop the carriage, release the key when the carriage reaches the end.
□	STOP	STOP	All servos are opened.
⏏	OPEN/CLOSE	(Disc tray) OPEN/CLOSE	Disc tray is opened and closed. However, pickup does not return to the park position. Moreover, even when disc is closed the pickup remains as is.

Table 10-1

Step No.	Oscilloscope Setting		Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure
	V	H				
1	**TRACKING ERROR OFFSET, FOCUS OFFSET AND RF OFFSET ADJUSTMENT**					
			TP1 PIN 2 (TRK.ERR) TP1 PIN 6 (FCS.ERR) TP1 PIN 1 (RF. OUTPUT)	VR5 (TRK.BAL) VR7 (TRK.OFS) VR6 (FCS.OFS) VR2 (RF.OFS)	45° 0V±50 mV FOCUS offset 0V±50 mV RF offset 100 mV±50 mV	• Set to TEST mode. (See page 42.) • Turn VR5 TRK.BAL (Tracking balance) volume clockwise 45° from the center. • Adjust with VR7 TRK OFS (Tracking error offset) volume so that the voltage of pin 3 TRK.ERR (Tracking error) of TP1 becomes 0V±50 mV. • Adjust VR6 FCS.OFS (focus offset) so that the FCS.ERR (focus error) voltage at TP1 pin 6 becomes 0V±50 mV. • Adjust VR2 RF.OFS (RF offset) so that the RF output voltage at TP1 PIN 1 becomes 100 mV±50 mV.
2	**LD (LASER DIODE) OUTPUT POWER CONFIRMATION**					
				VR1	Specification: 0.13 mW±0.01 mW	• Set to TEST mode. (See page 42.) • Press TRACK BACK key (|◁◁) and turn ON LD (laser diode). • Place sensor of the laser power meter immediately above the object lens and confirm that the output power of the LD is within 0.13 mW±0.01 mW. • If power is out of the specified range, adjust it with the LD OUTPUT POWER ADJ VR1 variable resistor.
3	**FOCUS LOCK AND SPINDLE LOCK CONFIRMATION**					
	V 0.5V/div	H 100 msec/div	TP1 Pin 1 (RF output)		RF output exists Normal rotation	• Set TEST disc. • Set to TEST mode. (See page 42.) • Shift the pickup close to the center of the disc by pressing the MANUAL SEARCH FWD key (▷▷). * Note that this step must be performed. • Observe pin 1 RF (RF output) of TP1 with an oscilloscope and confirm that the RF signal is output after pressing the TRACK FWD key (▷▷|). • Press PLAY key (▷) and be sure that the disc rotates in normal direction at almost the specified speed (as it is close to the center of the disc, the rotating speed is around 30 rpm) and not rotates abnormally or inversely.

<table>
<tr><th rowspan="2">Step No.</th><th colspan="2">Oscilloscope Setting</th><th rowspan="2">Test Points</th><th rowspan="2">Adjusting Points</th><th rowspan="2">Check items/ Adjustment specifications</th><th rowspan="2">Adjustment procedure</th></tr>
<tr><th>V</th><th>H</th></tr>
<tr><td>4</td><td colspan="6">GRATING ADJUSTMENT</td></tr>
<tr><td></td><td colspan="5">
Fig. 10-2


LPF
TP1
39kΩ
Pin 3 (TRK.ERR)
0.001μF
Pin 5 (GND)

Fig. 10-3</td><td>• Set to TEST mode. (See page 42.)
• Shift the pickup close to the center of the disc by pressing MANUAL SEARCH FWD key (⊳⊳) so that the grating adjustment screw of the pickup can be seen through the oval hole of the upper side of the servo mechanism.
• Insert a grating driver ( ) into the adjusting hole from the upper side of the mechanism as shown in Fig. 10-2, and confirm that the grating screw turns.
• Press TRACK FWD key (⊳⊳|) and PLAY key (⊳) sequentially and close the focus servo and spindle servo. (Do not close the tracking servo.)
• Observe the waveform of pin 3 TRK.ERR (Tracking error) of TP1 with an oscilloscope. At this point, insert a 4 kHz cutoff low-pass filter. (Fig. 10-3)</td></tr>
<tr><td></td><td>0.5V/div</td><td>5 ms/div</td><td>TP1
Pin 2
TRK.ERR</td><td>Grating
Grating</td><td>Null point
Maximum amplitude</td><td>• Turn a grating driver and find null point (Photo. 10-1).
• Then, turn slowly the grating driver clockwise from the null point and adjust at the point where the waveform (Tracking error signal) firstly becomes maximum amplitude. (See Photo. 10-3.)
Note:
If the grating driver is pressed strongly, the pickup moves toward disc center, accordingly adjustment becomes difficult.
• Finally, be sure to confirm that the tracking error signal (at this time, 4 kHz of cutoff low-pass filter is not inserted) when the pickup is moved toward the disc center and the P-P voltage of the tracking error signal at the outer circumference of the disc are not varied greatly. When the level is deviated over ±10%, adjust again by turning grating screw to the maximum error amplitude point.</td></tr>
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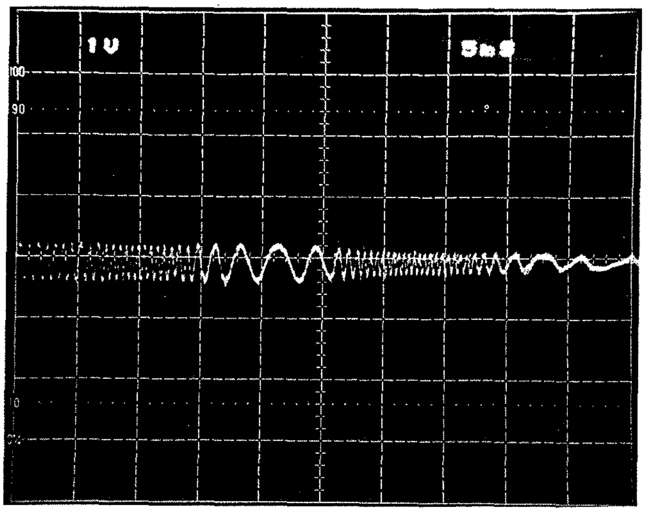


Photo. 10-1. Null point

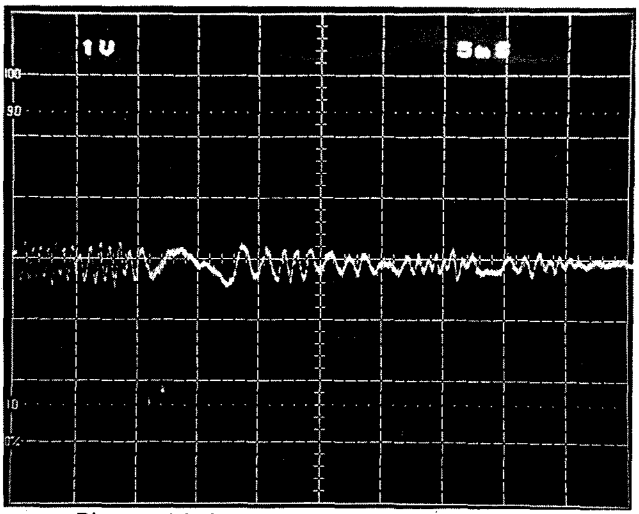


Photo. 10-2. Waveform of not null point

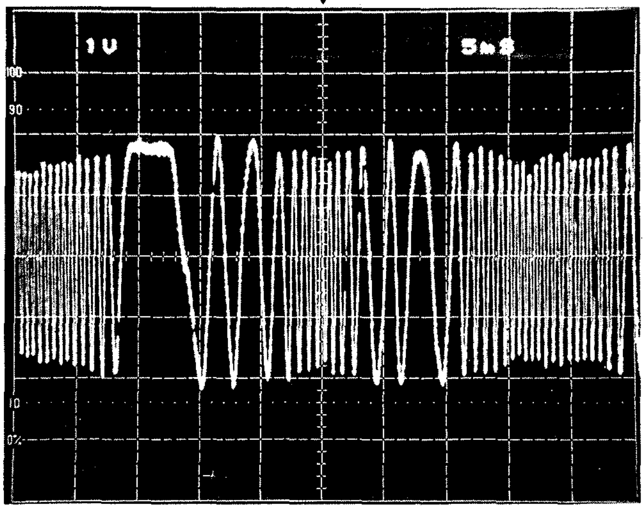


Photo. 10-3. Maximum amplitude

Step No.	Oscilloscope Setting		Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure
	V	H				
5	**TRACKING BALANCE ADJUSTMENT**					
		5 msec /div	TP1 Pin 2 (TRK.ERR)	VR5 (TRK.BAL)	(TRK.ERR)	• Set the TEST disc. • Set to TEST mode. (See page 42) • Shift the carriage close to the center of the disc by pressing MANUAL SEARCH FWD key (▷▷). • Press TRACK FWD key (▷▷I), and PLAY key (▷) to start turning the disc. • Observe pin 2 TRK.ERR (Tracking error) of TP1 with an oscilloscope and adjust with VR5 TRK.BAL (Tracking balance) volume so that the DC component of the tracking error disappears. Note: When this adjustment is performed, be sure to always perform tracking error offset adjustment.

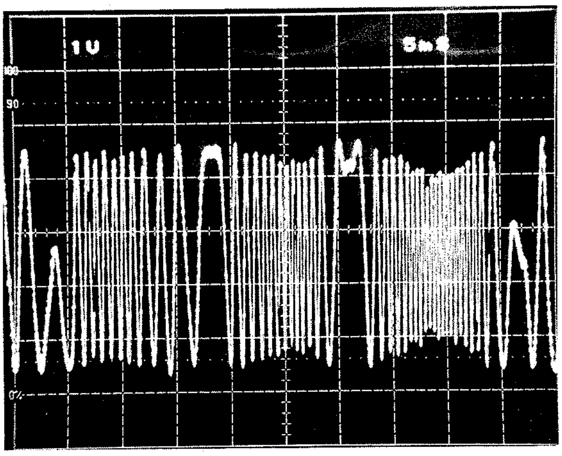


Photo. 10-4 DC component exists

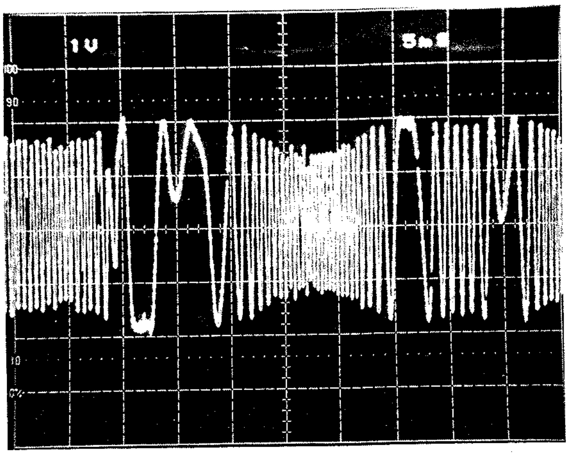
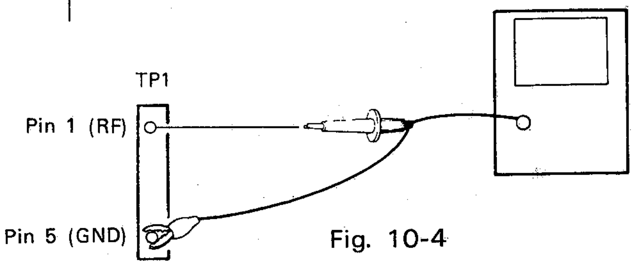


Photo. 10-5 DC component not exist

Step No.	Oscilloscope Setting		Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure
	V	H				
6	**TANGENTIAL ADJUSTMENT**					
		200nS	TP1 Pin 1 (RF output)	Tangential adjustment screw	Best eye pattern	• Set the TEST disc. • Set to TEST mode. (See page 42) • Shift the pickup close to the center of the disc by pressing MANUAL SEARCH FWD key (▷▷). • Press TRACK FWD key (▷▷|), PLAY key (▷) and PAUSE key (⏸) sequentially, and close all the servos. (Pause indicator lights up.) • Observe pin 1 RF (RF output) of TP1 with an oscilloscope and adjust with the tangential screw so that the eye pattern becomes clear. (Fig. 10-4) • The adjusting point is the middle point between the point where the eye pattern becomes deteriorate by turning the tangential screw clockwise and the point where the eye pattern becomes deteriorate by turning the tangential screw counterclockwise. As a criterion, observe that the overall waveform is clear and one of the diamond shapes within the eye pattern (Photo. 10-6), and adjust at as an optimum point where the diamond shape is seen relatively fine line.  Fig. 10-4 Note: During the adjustment, hold hexagonal wrench to upward so as to keep the pickup body not goes down.

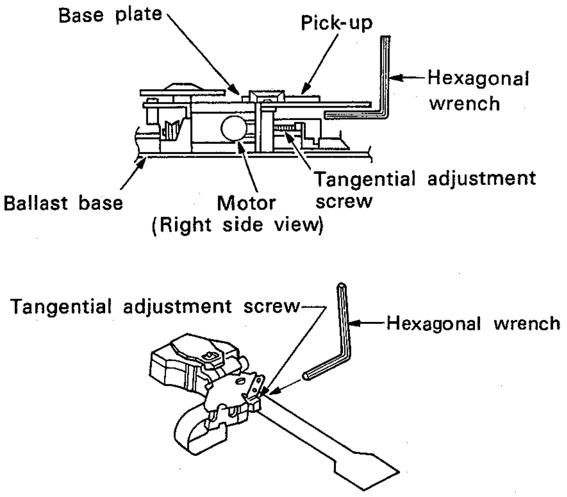

Base plate
Pick-up
Hexagonal wrench
Tangential adjustment screw
Ballast base
Motor
(Right side view)
Tangential adjustment screw
Hexagonal wrench

Fig. 10-5 Tangential adjustment

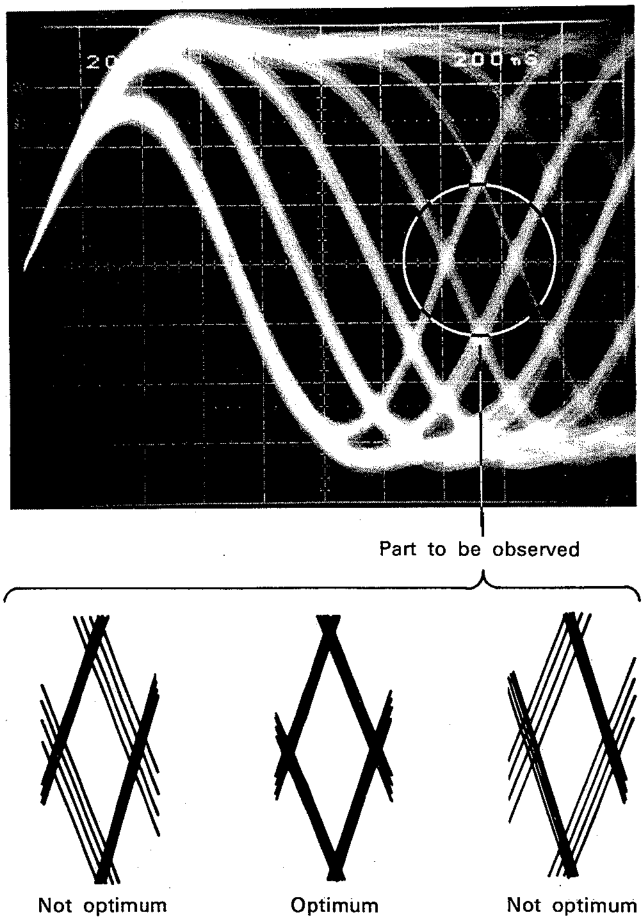

20
200 nS
Part to be observed
Not optimum
Optimum
Not optimum

Photo. 10-6

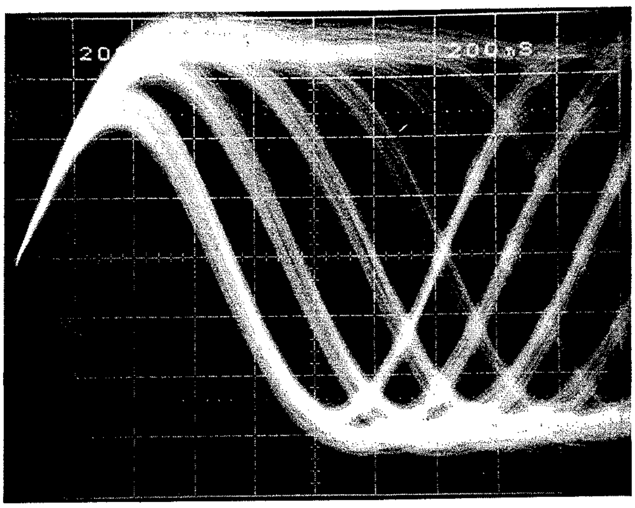


Photo. 10-7

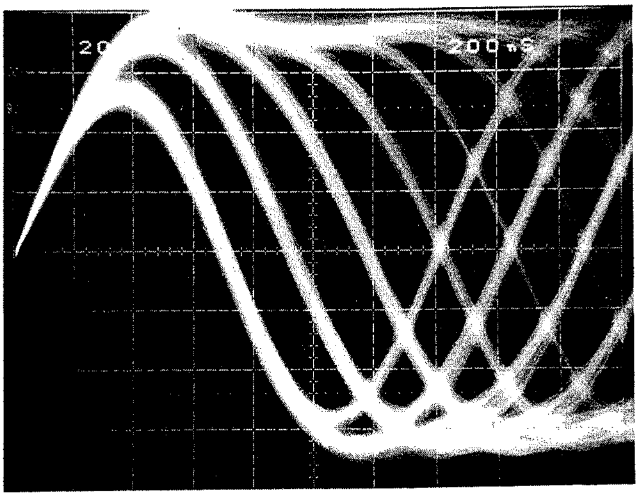


Photo. 10-8

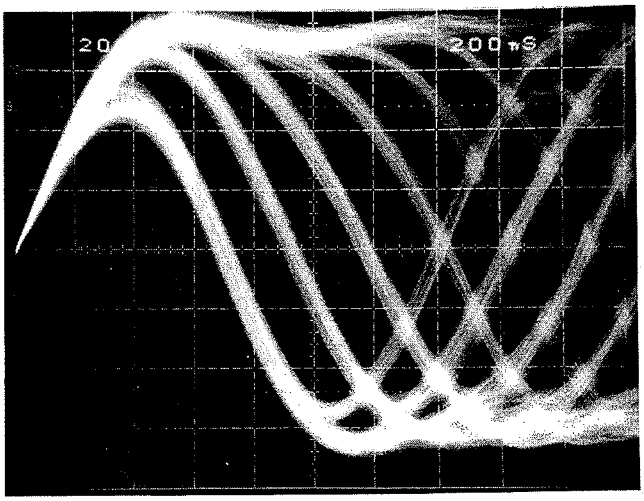
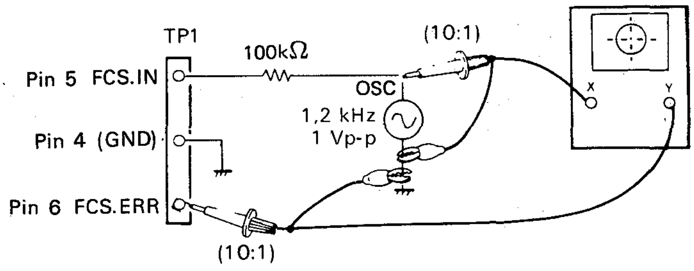


Photo. 10-9

Step No.	Oscilloscope Setting		Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure
	V	H				
7	**RF LEVEL CONFIRMATION**					
			TP1 Pin 1 (RF)	VR1 Laser power	2.0Vp-p ±0.6Vp-p	• Set to TEST mode. (See page 42) • Play TEST disc and connect probe of an oscilloscope to pin 1 RF (RF output) of TP1 and measure the P-P voltage of RF waveform. • Confirm that the value is within 2.0V±0.6 Vp-p. • In case it is over 2.6 Vp-p, adjust it to the specified range.
8	**FOCUS GAIN ADJUSTMENT**					
	20mV/div.5/mV/div. CH1 (X), CH2 (Y) (Probe 10 : 1)		X axis TP1 Pin 5 (FCS.IN) Y axis TP1 Pin 6 (FCS.ERR)	VR3 (FCS.GAIN)	Phase difference 90°	• In the POWER OFF state, connect an oscilloscope and oscillator as shown in Fig. 10-6. • Set to TEST mode. (See page 42) • Press TRACK FWD key (▷▷|), PLAY key (▷) and PAUSE key (▯▯) sequentially, and turn ON the each servos of focus, spindle and tracking. • Turn the POWER of oscillator ON and output 1.2 kHz 1 Vp-p. Note: (Depending upon oscillators, some of them output DC when their power turned ON. Therefore, it is desirable to connect oscillator after turning the power ON.) • Adjust with VR3 FCS.GAN (Focus gain) volume so that the lissajous figure of the oscilloscope becomes horizontal circle (Phase difference 90°).  TP1 100kΩ (10:1) Pin 5 FCS.IN OSC 1,2 kHz 1 Vp-p Pin 4 (GND) Pin 6 FCS.ERR (10:1) X Y Fig. 10-6

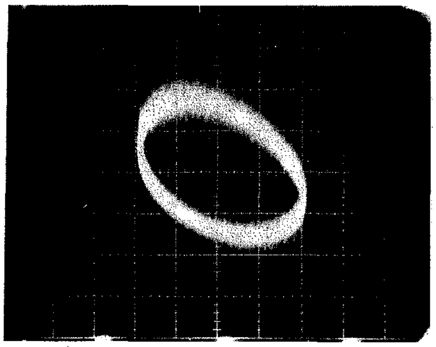


Photo. 10-10 High gain

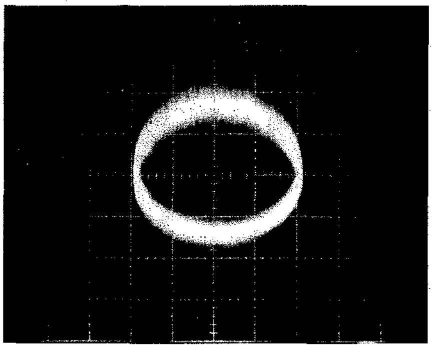


Photo. 10-11 Optimum gain

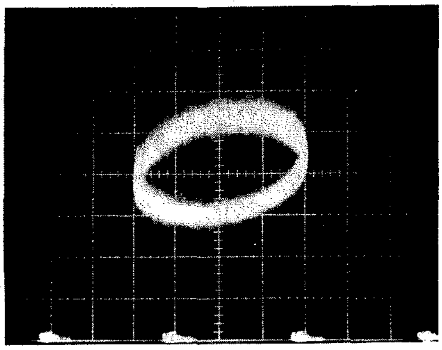


Photo. 10-12 Low gain

Step No.	Oscilloscope Setting		Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure
	V	H				
9	**TRACKING GAIN ADJUSTMENT**					
	50 mV/div.5mV/div. CH1 (X), CH2 (Y) (Probe 10 : 1)		X axis TP1 Pin 3 (TRK.IN) Y axis TP1 Pin 2 (TRK.ERR)	VR4 (TRK.GAN)	Phase difference 90°	• In the POWER OFF state, connect an oscilloscope and oscillator as shown in Fig. 10-7. • Set to TEST mode. (See page 42) • Press TRACK FWD key (⊳⊳I), PLAY key (⊳) and PAUSE key (▯▯) sequentially, and turn ON the each servos of focus, spindle and tracking. Turn the POWER of oscillator ON and output 1.2 kHz 2 Vp-p. Note: (Depending upon oscillators, some of them output DC when their power turned ON. Therefore, it is desirable to connect oscillator after turning the power ON.) • Adjust with VR4 TRK GAN (Tracking gain) volume so that the lissajous figure of the oscilloscope becomes horizontal circle (phase difference 90°).

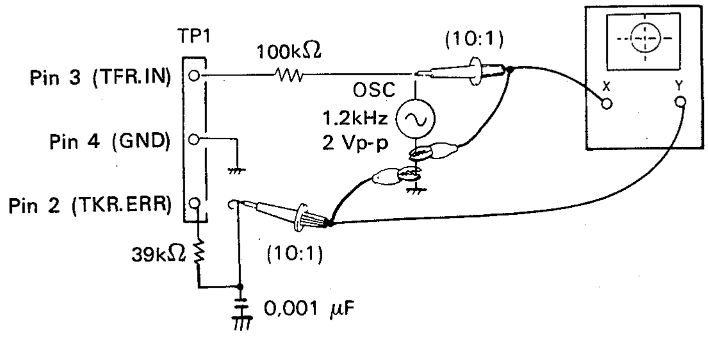


Fig. 10-7

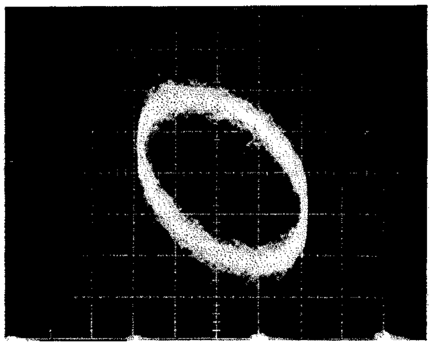


Photo. 10-13 High gain

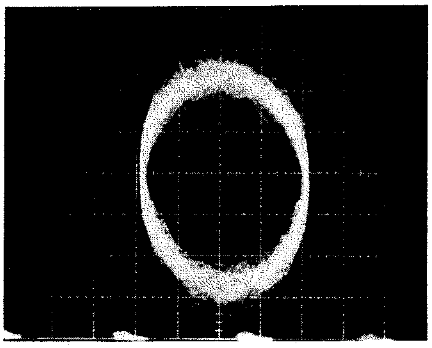


Photo. 10-14 Optimum gain

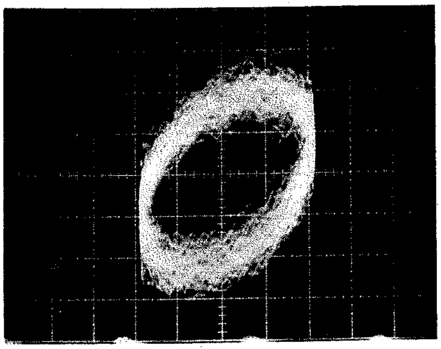
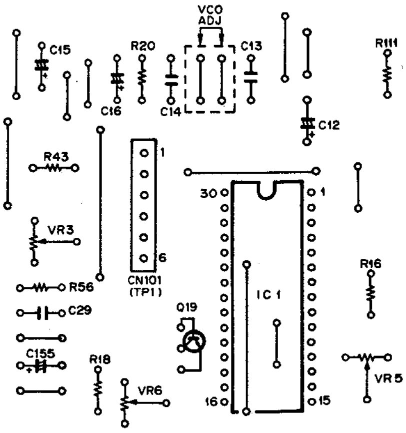


Photo. 10-15 Low gain

Step No.	Oscilloscope Setting		Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure
	V	H				
10	**VCO FREE RUN FREQUENCY ADJUSTMENT**					
			TP2 Pin 2	VR8 (VCO.ADJ)	4.375 ±0.025 MHz	• Set to TEST mode. (See page 42) • Short-circuit between ASY and GND jumper with grating driver, etc. (Fig. 10-8) • Connect frequency counter, which is measurable over 10 MHz, to pin 2 of TP2. • Adjust with VR8.VCO ADJ (VCO adjustment) volume so that the value of frequency counter becomes 4.375±0.025 MHz.  VCO ADJ C15 R20 C13 R111 C16 C14 C12 R43 1 30 1 VR3 6 R16 R56 CN101 (TP1) C29 Q19 IC1 C155 R18 VR6 16 15 VR5 Fig. 10-8
11	**METHOD TO CONFIRM S CHARACTER (FOCUS ERROR)**					
						• Set to TEST mode. (See page 42) • Short-circuit between pin 6 FCS, IN (Focus in) of TP1 and GND. • Press TRACK FWD key (▷▷|) and observe the waveform of pin 7 FCS.ERR (Focus error) of TP1 at that time with an oscilloscope.

10. RÉGLAGES

Les réglages pour ce modèle doivent être réalisés dans l'ordre indiqué ci-dessous.

• Réglage à effectuer

1. Réglages de l'offset d'erreur de suivi, de l'offset de focalisation et de l'offset HF.
2. Vérification de la puissance de sortie de la diode laser (LD)
3. Vérification du verrouillage de focalisation et du verrouillage de moyeu
4. Réglage du réseau
5. Réglage de l'équilibrage de centrage de piste
6. Réglage tangentiel
7. Vérification du niveau RF
8. Réglage du gain de focalisation
9. Réglage du gain de centrage de piste
10. Réglage de la fréquence propre du VCO

• Matériel de mesure

1. Oscilloscope double trace
2. Appareil de mesure pour puissance laser
3. Disque d'essai (YEDS7)
4. Filtre de réglage pour équilibrage de centrage de piste
5. Filtre de réglage pour gain de boucle
6. Générateur de signal
7. Fréquencementre
8. Outillage général divers

• Mode d'essai

Tous les réglages doivent être réalisés dans le mode d'essai (Test Mode).

Méthodes de réglage et d'annulation du mode d'essai

(1) Pour régler le mode d'essai, placer l'interrupteur d'alimentation (POWER) du lecteur (SW101) sur la position de marche (ON) en appuyant sur l'interrupteur de mode d'essai (TEST MODE SWITCH).

(2) Pour annuler le mode d'essai, amener simplement l'interrupteur d'alimentation (POWER) du lecteur sur la position d'arrêt (OFF).

Les différentes fonctions des touches dans le mode d'essai sont indiquées dans le tableau 10-1.

• Points de réglage

VR1: Puissance laser
VR7: Décalage de centrage de piste (TRK.OFS)
VR3: Gain de focalisation (FCS.GAN)
VR4: Gain de centrage de piste (TRK.GAN)
VR5: Equilibrage de centrage de piste (TRK.BAL)
VR6: Décalage de focalisation (FCS.OFS)
VR8: Réglage du VCO (VCO.ADJ)
VR2: Offset RF (RF.OFS)

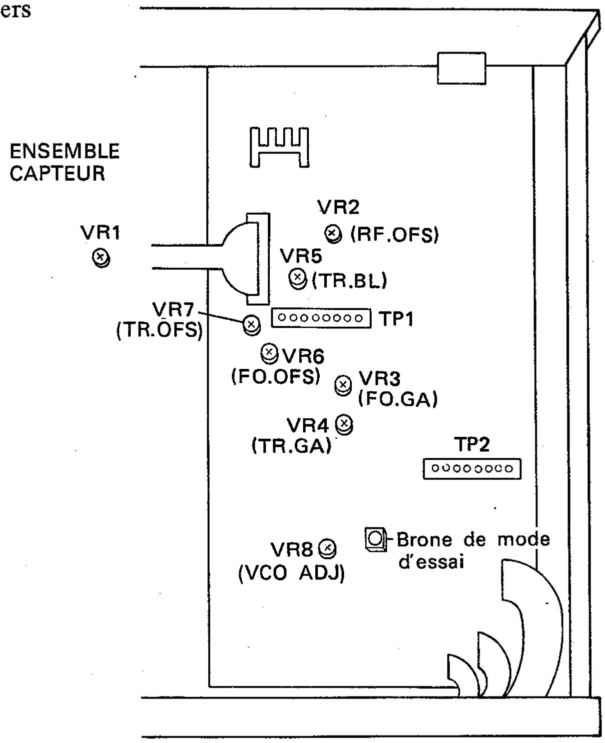


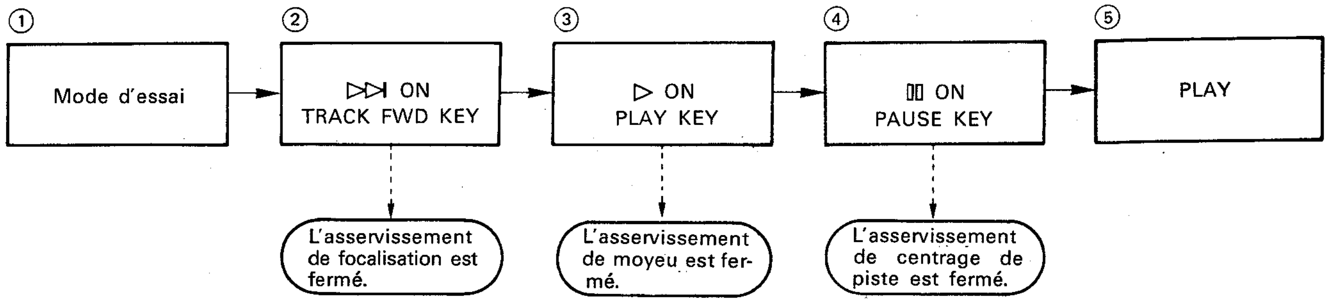
Fig. 10-1 Point de réglage

Dans le mode d'essai (Test Mode), chaque circuit asservi peut être fermé ou ouvert au moyen d'opérations séparées. En conséquence, les asservissements doivent être fermés l'un après l'autre (séquentiellement) pour régler le mode de lecture (PLAY).

Note: Le mode de lecture (PLAY) n'est pas simplement mis en oeuvre par l'enfoncement de la touche PAUSE (▯▯) dans le mode d'essai.

Exemple: Commutation du mode d'arrêt (STOP) au mode de lecture (PLAY).

* Dans le mode d'essai (Test Mode), chaque servomécanisme agit séquentiellement.

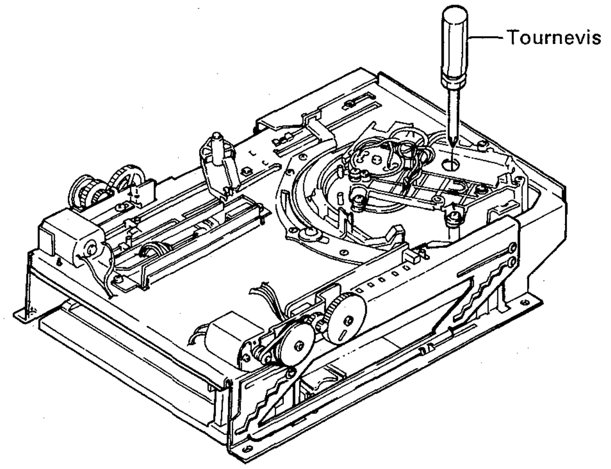
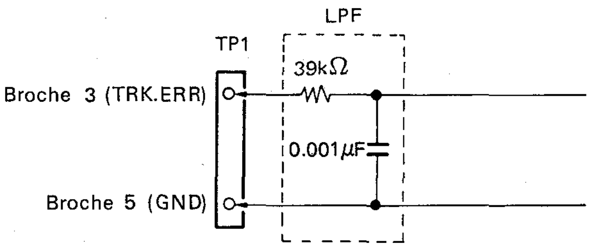

①
Mode d'essai
②
▷▷| ON
TRACK FWD KEY
③
▷ ON
PLAY KEY
④
▯▯ ON
PAUSE KEY
⑤
PLAY
L'asservissement de focalisation est fermé.
L'asservissement de moyeu est fermé.
L'asservissement de centrage de piste est fermé.

• Fonction des touches dans le mode d'essai (Test Mode)

Symbole	Désignation de touche	Fonction pendant le mode d'essai	Description
|◁◁	TRACK BACK	Diode laser allumée	La diode laser s'allume.
▷▷|	TRACK FWD	Asservissement de focalisation fermé	La diode laser s'allume. Le moteur d'asservissement se déplace vers le haut/bas, puis l'asservissement de focalisation est fermé.
▷	PLAY	Asservissement de moyeu fermé	Le moyeu commence à tourner et l'asservissement est fermé lorsqu'il passe dans le mode CLV-A.
▯▯	PAUSE	Asservissement de centrage de piste ouvert/fermé	Réalise l'opération de bascule. Fermeture de l'asservissement de centrage de piste et passage en mode de lecture (PLAY) en appuyant sur la touche (l'asservissement de focalisation et l'asservissement de moyeu doivent se fermer); le voyant de PAUSE s'allume. L'asservissement de centrage de piste s'ouvre par une nouvelle pression sur la touche.
◁◁	MANUAL SEARCH REV	Le chariot se déplace en arrière (vers le centre du disque).	Le chariot se déplace vers le centre du disque à une vitesse élevée d'environ 3 cm/s. Comme il n'y a pas de dispositif de sécurité, relâcher la touche dès que le chariot arrive en fin de course.
▷▷	MANUAL SEARCH FWD	Le chariot se déplace en avant (vers le centre du disque).	Le chariot se déplace vers la fin du disque à la vitesse élevée d'environ 3 cm/s. Comme il n'y a pas de dispositif de sécurité, relâcher la touche dès que le chariot arrive en fin de course.
□	STOP	Arrêt	Tous les asservissements sont ouverts
⏏	OPEN/CLOSE	Ouverture/fermeture du plateau de disque	Le plateau de disque est ouvert et fermé. Néanmois, la tête de lecture ne revient pas sur sa position de repos. De plus, même lorsque le disque est enfermé, la tête de lecture demeure tel quel.

Tableau 10-1

Pas No.	Réglage de l'oscilloscope		Points d'essai	Points de réglage	Points de contrôle/ spécifications de réglage	Méthode de réglage
	V	H				
1.	**RÉGLAGES DE L'OFFSET D'ERREUR DE SUIVI, DE L'OFFSET DE FOCALISATION ET DE L'OFFSET HF**					
				VR5 (TRK.BAL)	45°	• Régler le mode d'essai (TEST). (Voir page 53.) • Tourner le potentiométre VR5 TRK.BAL (équilibrage de centrage de piste) de 45° depuis le centre dans le sens des aiguilles d'une montre.
			TP1 broche 2 (TRK.ERR)	VR7 (TRK.OFS)	0V±50 mV	• Ajuster le potentiométre VR7 TRK.OFS (décalage d'erreur de centrage de piste) de fąon à ce que la tension à la broche 3 TRK.ERR (erreur de centrage de piste) de TP1 deviennent égale a 0V±50 mV.
			TP1 BROCHE 6 (FCS.ERR)	VR6 (FCS.OFS)	Offset de focalisation 0V±50 mV	• Régler VR6 FCS.OFS (offset de focalisation) de manière à oe que la tension de FCS.ERR (erreur de focalisation) relevée sur la broche 6 de TP1 moit de 0V±50 mV.
			TP1 BROCHE 1 (RF OUTPUT)	VR2 (RF.OFS)	Offset RF 100 mV±50 mV	• Régler VR2 RF.OFS (offset HF) de manière à ce que la tension de RF OUTPUT (sortie HF) relevée sur la broche 1 de TP1 soit de 100 mV±50 mV.
2.	**CONTRÔLE DE LA PUISSANCE DE SORTIE DE LA DIODE LASER (LD)**					
					Spécification: 0,13 mW±0,01 mW	• Régler le mode d'essai (TEST). (Voir page 53.) • Appuyer sur la touche de centrage de piste arrière (TRACK BACK) (⏮) et enclencher la diode laser (LD). • Placer la capteur de l'inatrument destiné à mesure la puissance laser au dessus de l'objectif et vérifier que la puissance de sortie de la diode laser (LD) est de 0,13 mW±0,01 mW.
				VR1		• Si la puissance de sortie se trouve en dehore des tolérances, la régler à l'aide de la résistance variable de réglage de la puissance de sortie de la diode laser (LD OUTPUT POWER ADJ VR1).
3.	**CONTRÔLE DU VERROUILLAGE DE FOCALISATION ET DU VERROUILLAGE DE MOYEU**					
						• Mettre en place le disque d'essai (TEST). • Régler le mode d'essai (TEST). (Voir page 53.) • De 38placer la tête de lecture às proximité du centre du disgue en appuyant sur la touche de recherche (MANUAL SEARCH FWD (▷▷)). * Cette étape doit absolument être réalisée.
					Présence de sortie RF	• Observer le signal RF a 58 la broche 1 de TP1 (sortie RF) au moyen d'un oscilloscope et vérifier que le signal RF sorte après l'enfoncement de la touche d'avance de piste TRACK FWD (▷▷▏).
	V 0,5 V/div.	H 100 ms/div.	TP1 broche 1 (sortie RF)		Rotation normale	• Appuyer sur la touche de lecture (PLAY) (▷) et s'assurer que le disque tourne en sens normal avec approximativement la vitesse spécifiée (étant prèss du centre du disque, la vitesse de rotation est d'environ 30 tr/mn), sans anomalie ni inversion du sens de rotation.

Pas No.	Réglage de l'oscilloscope		Points d'essai	Points de réglage	Points de contrôle/ spécifications de réglage	Méthode de réglage
	V	H				
4.	**RÉGLAGE DE LA MIRE**					
	 Fig. 10-2  LPF TP1 39kΩ Broche 3 (TRK.ERR) 0.001μF Broche 5 (GND) Fig. 10-3					• Régler le mode d'essai (TEST). (Voir page 53.) • Amener la tête de lecture à proximité du centre du disque en appuyant sur la touche de recherche manuelle avant (MANUAL SEARCH FWD) (▷▷), de façon à ce que la vis de réglage du réseau de la tête de lecture puisse être vue à travers le trou oval situé à la partie suoérieure de l'asservissement. • Introduire un outil pour réseau ( ) dans le trou de rége depuis la partie supérieure du mécanisme, comme illustré à la figure 10-2, puis vérifier que la vis de réseau tourne. • Appuyer séquentiellement sur les touches de piste avant TRACK FWD (▷▷|) et de lecture (PLAY) (▷), et fermer les asservissements de focalisation et de moyeu. (Ne pas fermer l'asservissement de centrage de piste.) • *Observer la forme d'onde à la broche* 3 TRK.ERR (erreur de centrage de piste) de TP1 au moyen d'un oscilloscope. Introduire alors un filtre de coupure passe-bas 4 kHz. (*Figure* 10-3)
	0,5 V/div.	5 ms/div.	TP1 Broche 2 TRK.ERR	Réseau Réseau	Point zéro Amplitude maximum	• Faire touner un autil de réseau et rechercher le point zéro. (Photo 10-1.) • Tourner ensuite lentement dans le sens des aiguilles d'une montre l'outil de réseau depuis le point zéro et l'ajuster sur le point où la forme d'onde (signal d'erreur de centrage de piste) présente une première amplitude maximum. (Voir photo 10-3.) Note: Si l'outil de réseau est appuyé avec force, la tête de lecture se déplace vers le centre du disque et le réglage devient difficile à effectuer. • Finalement, s'assurer que le signal d'erreur de centrage de piste (cette fois-ci le filtre de coupure passe-bas à 4 kHz n'est pas introduit) n'a pas beaucoup varié lorsque la tête de lecture est déplacée vers le centre du disque, et aussi que la tension C-C du signal de centrage de piste n'a pas non plus beaucoup varié sur la circonférence extérieure du disque. Lorsque le niveau varie de plus de ±10%, recommencer le réglage en tournant la vis de réseau jusqu'au point d'amplitude d'erreur maximum.

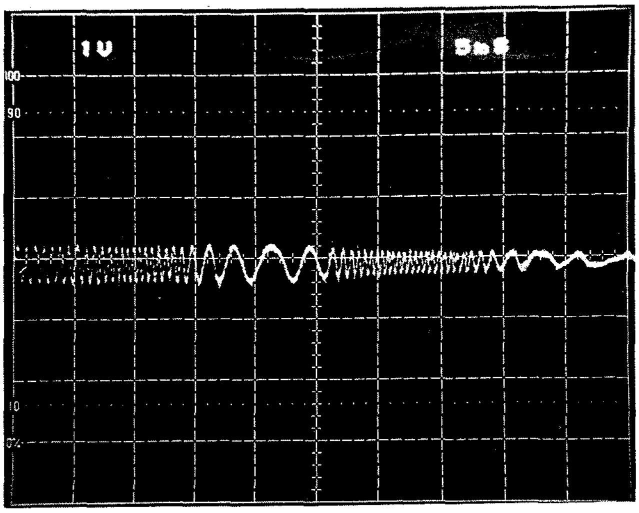


Photo 10-1 Point zéro

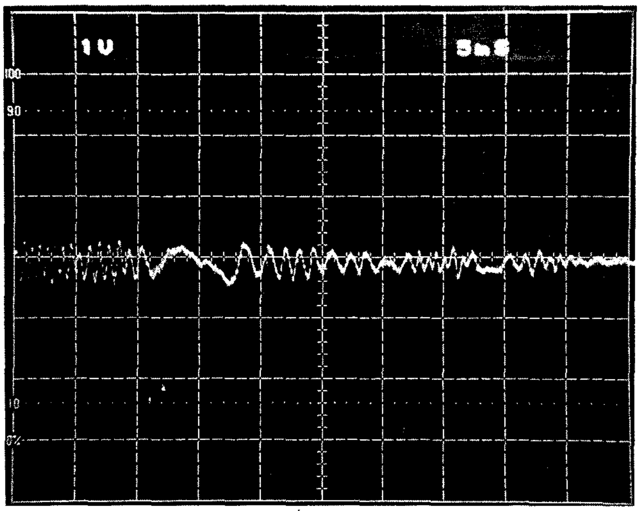


Photo 10-2 Forme d'onde hors du point zéro

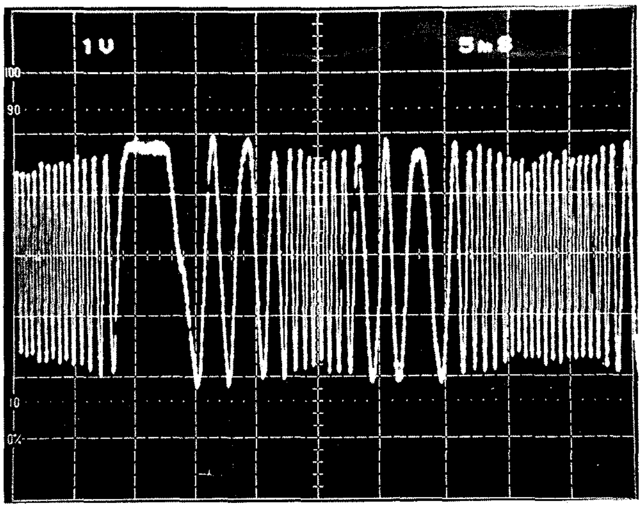


Photo 10-3 Amplitude maximum

Pas No.	Réglage de l'oscilloscope		Points d'essai	Points de réglage	Points de contrôle/ spécifications de réglage	Méthode de réglage
	V	H				
5.	**RÉGLAGE DE L'ÉQUILIBRAGE DE CENTRAGE DE PISTE**					
	0,5 V/div.	5 ms/div.	TP1 Broche 2 (TRK.ERR)	VR5 (TRK.BAL)	TRK.ERR	• Mettre en place le disque d'essai (TEST). • Régler le mode d'essai (TEST). (Voir page 53.) • Amener la tête de lecture à proximité du centre du disque en appuyant sur la touche de recherche manuelle avant (MANUAL SEARCH FWD) (⊳⊳). • Appuyer sur la touche de piste avant (TRACK FWD) (⊳⊳|) et sur la touche de lecture (PLAY) (⊳) pour faire tourner le disque. • Observer la broche 2 TRK.ERR (erreur de centrage de piste) de TP1 au moyen d'un oscilloscope et ajuster au moyen du potentiomètre VR5 TRK.BAL (équilibrage de centrage de piste) de façon à ce que la composante continue de l'erreur de centrage de piste disparaisse. Note: Prendre soin de toujours réaliser le réglage du décalage d'erreur de centrage de piste lorsque le présent réglage est effectué.

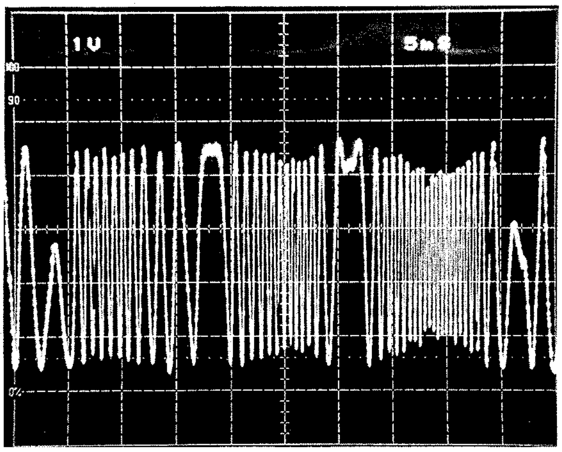


Photo 10-4 Présence de la composante continue

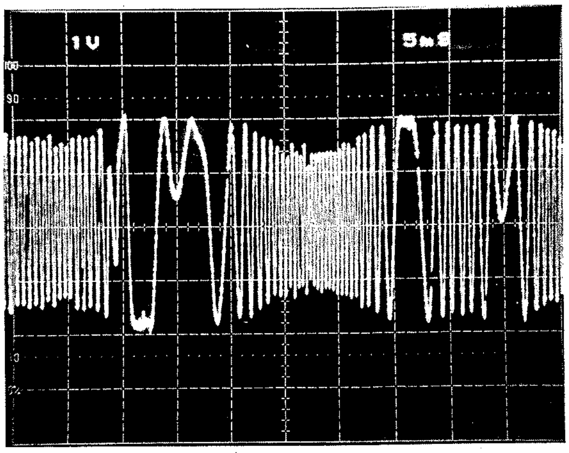
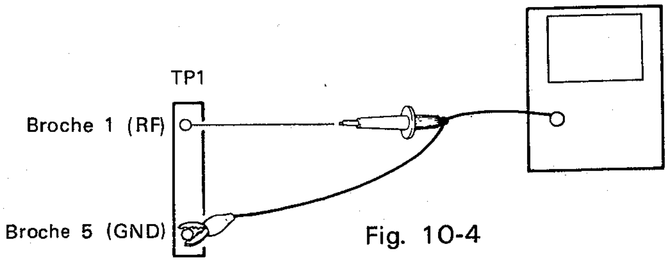


Photo 10-5 Absence de la composante continue

Pas No.	Réglage de l'oscilloscope		Points d'essai	Points de réglage	Points de contrôle/ spécifications de réglage	Méthode de réglage
	V	H				
6.	**RÉGLAGE TANGENTIEL**					
		200 ns	TP1 Broche 1 (sortie RF)	Vis de réglage tangentiel	Mire Best Eye	• Mettre en place le disque d'essai (TEST) • Régler le mode d'essai (TEST). (Voir page 53.) • Amener la tête de lecture à proximité du centre du disque en appuyant sur la touche de recherche manuelle avant (MANUAL SEARCH FWD) (▷▷). • Appuyer séquentiellement sur les touches d'avance de piste (TRACK FWD) (▷▷|), de lecture (PLAY) (▷) et de pause (PAUSE) (▯▯), et fermer tous les asservissements. (Le voyant de pause s'allume.) • Observer le signal RF à la broche 1 (sortie RF) de TP1 au moyen d'un oscilloscope et régler au moyen de la vis tangentielle, de façon à ce que la mire Best Eye devienne claire. (Figure 10-4) • Le point de réglage se situe au milieu entre le point ou la mire se détériore en tournant la vis tangentielle dans le sens des aiguilles d'une montre et le point où la mire se détériore en tourant la vis tangentielle dans le sens inverse des aiguilles d'une montre. Comme critère, observer que la forme d'onde globale soit claire et que l'une des formes de losange se situe dans la mire (Photo 10-6); réaliser le réglage en un point optimum où la forme de losange apparaît avec des traits relativement fins.  Fig. 10-4 Note: Pendant le réglage, tenir la clex six-pans vers le haut de façon à ce que le corps de la tête de lecture ne descende pas.

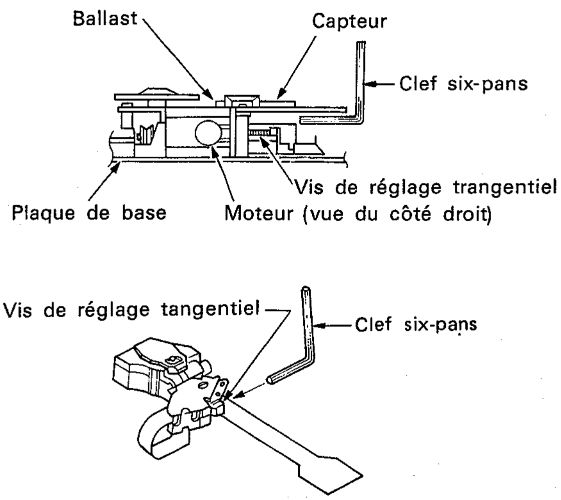
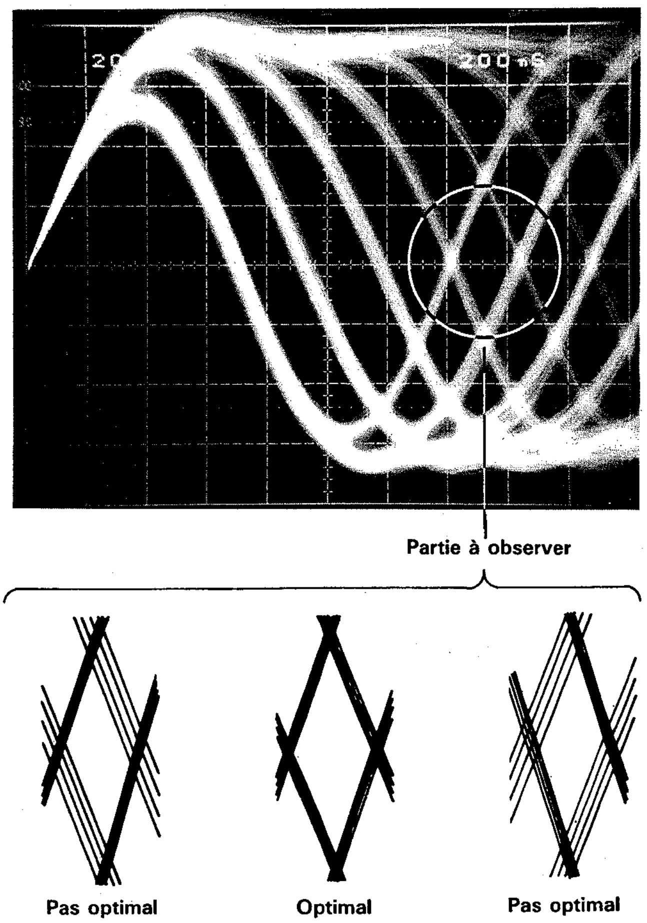

Ballast
Capteur
Clef six-pans
Vis de réglage trangentiel
Plaque de base
Moteur (vue du côté droit)
Vis de réglage tangentiel
Clef six-pans

Fig. 10-5 Réglage tangentiel



Pas optimal

Optimal

Pas optimal

Photo 10-6

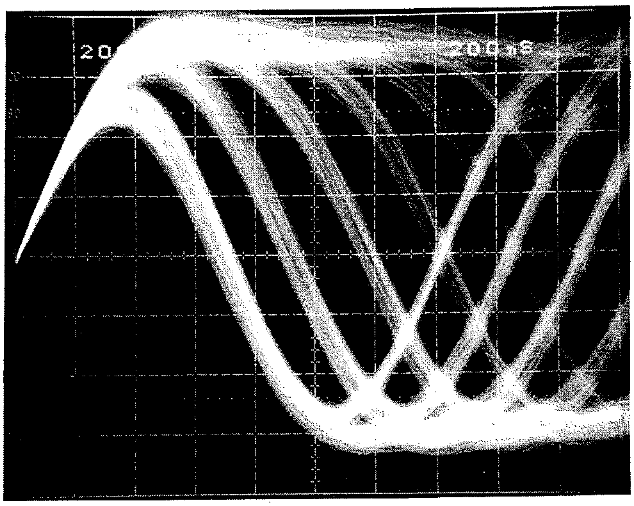


Photo 10-7

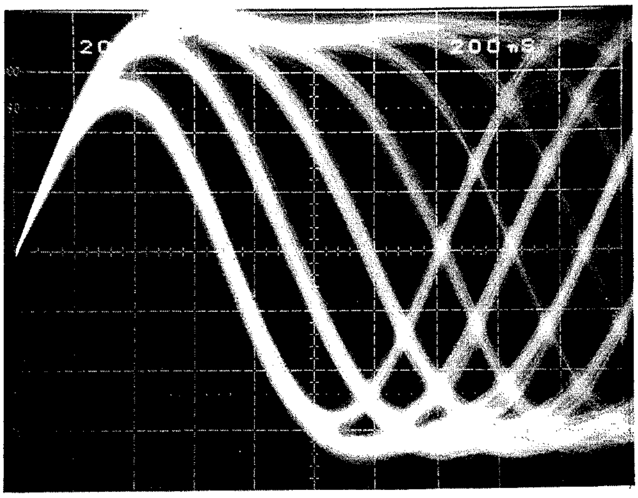


Photo 10-8

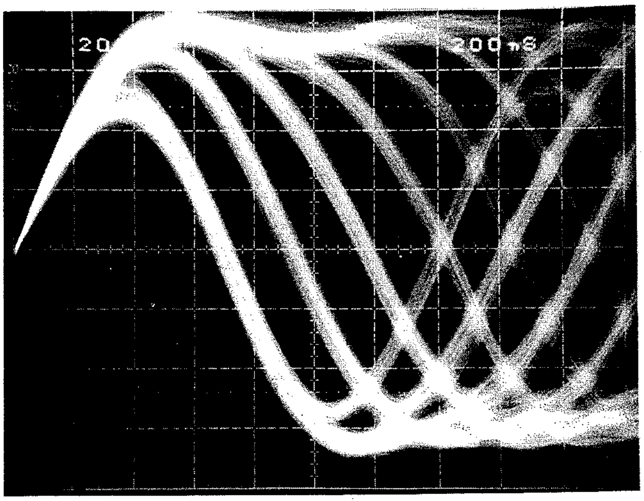
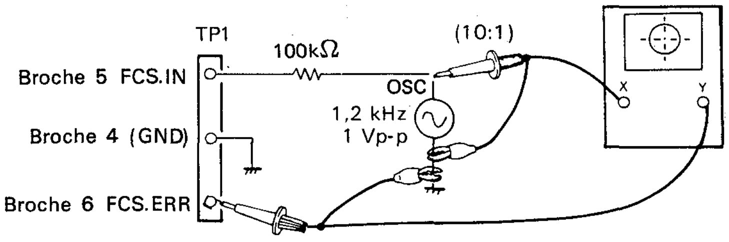


Photo 10-9

Pas No.	Réglage de l'oscilloscope		Points d'essai	Points de réglage	Points de contrôle/ spécifications de réglage	Méthode de réglage
	V	H				
7.	**CONTRÔLE DU NIVEAU RF**					
			TP1 Broche 1 (RF)	VR1 Puissance laser	2.0 Vc-c ±0.6 Vc-c	• Régler le mode d'essai (TEST). (Voir page 53.) • Reproduire le disque d'essai (TEST) et raccorder la sonde d'un oscilloscope à la broche 1 RF (sortie RF) de TP1 et mesurer la tension C-C de la forme d'onde RF. • Vérifier que la tension est de 2,0V±0,6 Vcc. • Si la tension est supérieure à 2,6 Vcc, la régler dans la plage spécifiée.
8.	**RÉGLAGE DU GAIN DE FOCALISATION**					
	20 mV/div. 5 mV/div. Canal 1(X), Canal 2(Y) (Sonde 10:1)		Axe X TP1 Broche 5 (FCS.IN) Axe Y TP1 Broche 6 (FCS.ERR)	VR3 (FCS.GAIN)	Différence de phase 90°.	• L'alimentation étant coupée (POWER OFF), raccorder un oscilloscope et un oscillateur de la manière indiquée à la figure 10-6. • Régler le mode d'essai (TEST). (Voir page 53.) • Appuyer séquentiellent sur les touches d'avance de piste (TRACK FWD) (⏭), de lecture (PLAY) (▷) et de pause (PAUSE) (⏸), puis enclencher chaque asservissement de focalisation, moyeu et centrage de piste. • Enclencher l'alimentation de l'oscillateur et délivrer un signal de 1,2 kHz à 1 Vc-c. Note: (En fonction de l'oscillateur utilisé, certains appareils fournissent un courant continu lors de leur enclenchement. Par conséquent, il est *préférable de raccorder l'oscillateur aprés avoir* enclenché son alimentation.) • Ajuster le potentiomètre VR3 FCS.GAN (gain de focalisation) de façon à ce que la figure de Lissajou observée sur l'oscilloscope devienne un cercle horizontal (déphasage 90°).  TP1 Broche 5 FCS.IN Broche 4 (GND) Broche 6 FCS.ERR 100kΩ (10:1) OSC 1,2 kHz 1 Vp-p (10:1) X Y Fig. 10-6

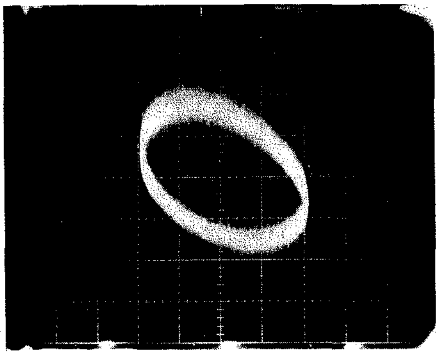


Photo 10-10 Gain élevé

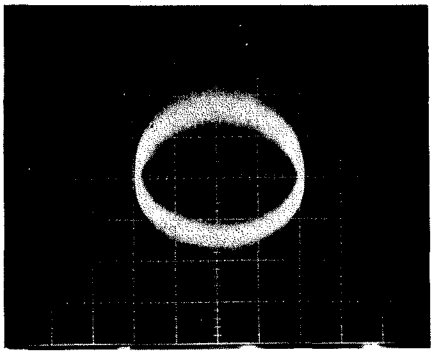


Photo 10-11 Gain optimum

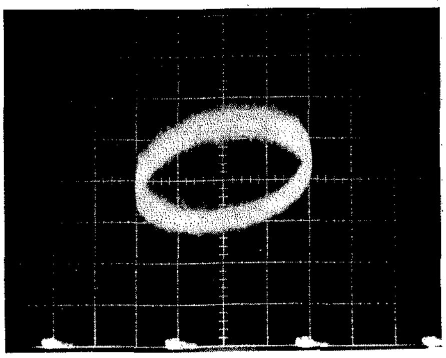


Photo 10-12 Gain réduit

Pas No.	Réglage de l'oscilloscope V	H	Points d'essai	Points de réglage	Points de contrôle/ spécifications de réglage	Méthode de réglage
9.	**RÉGLAGE DU GAIN DE CENTRAGE DE PISTE**					
	50 mV/div. 5 mV/div. Canal 1 (X), Canal 2 (Y) (Sonde 10:1)		Axe X TP1 Broche 3 (TRK.IN) Axe Y TP1 Broche 2 (TRK.ERR)	VR4 (TRK.GAN)	Déphasage 90°	• L'alimentation étant coupée (POWER OFF), raccorder un oscilloscope et un oscillateur de la manière indiquée à la figure 10-7. • Régler le mode d'essai (TEST). (Voir page 53.) • Appuyer séquentiellement sur les touches d'avance de piste (TRACK FWD) (⏭), de lecture (PLAY) (▷) et de pause (PAUSE) (⏸), puis enclencher chaque asservissement de focalisation, moyeu et centrage de piste. Enclencher l'alimentation de l'oscillateur et fournir un signal de 1,2 kHz à 2 Vc-c. Note: (En fonction de l'oscillateur utilisé, certains appareils fournissent un courant continu lors de leur enclenchement. Par conséquent, il est préférable de raccorder l'oscillateur après avoir enclenché son alimentation.) • Ajuster le potentiomètre VR4 TRK GAN (gain de centrage de piste) de façon à ce que la figure de Lissajou sur l'oscilloscope devienne un cercle horizontal (déphasage 90°).

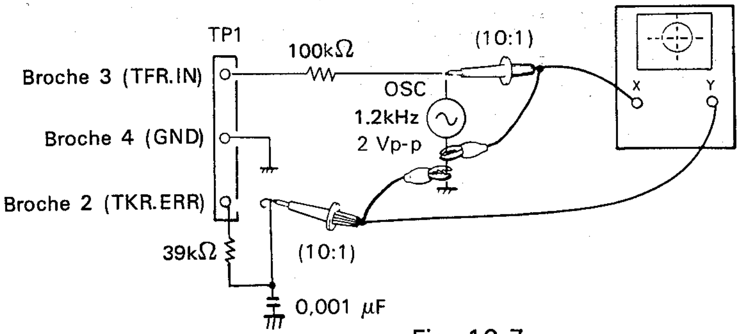


Fig. 10-7

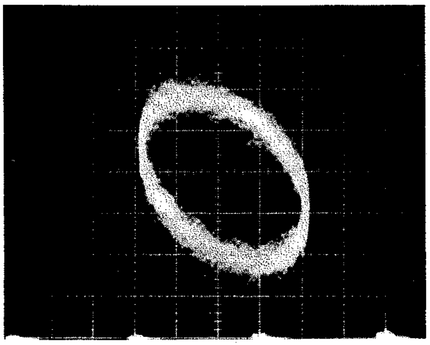


Photo 10-13 Gain élevé

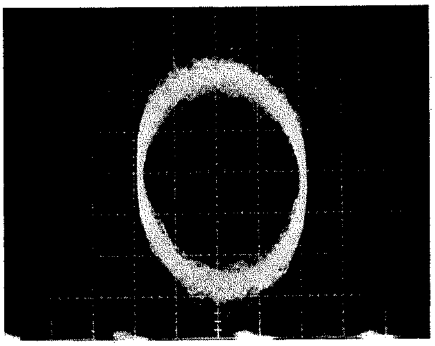


Photo 10-14 Gain optimum

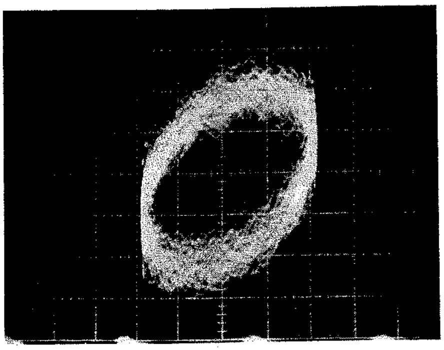
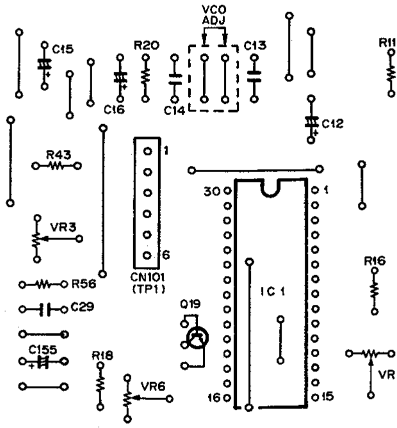


Photo 10-15 Gain réduit

Pas No.	Réglage de l'oscilloscope		Points d'essai	Points de réglage	Points de contrôle/ spécifications de réglage	Méthode de réglage
	V	H				
10.	**RÉGLAGE DE LA FRÉQUENCE PROPRE DU VCO**					
			TP2 Broche 2	VR8 (VCO.ADJ)	4,375 ±0,025 MHz	• Régler le mode d'essai (TEST). (Voir page 53.) • Court-circuiter entre les ponts ASY et GND au moyen de l'outil de réseau, etc. (Figure 10-8) • Raccorder un fréquencemètre capable de mesurer au-dessus de 10 MHz à la broche 2 de TP2. • Ajuster le potentiomètre VR8 VCO ADJ (réglage du VCO) de façon à ce que la valeur indiquée par le fréquencemètre devienne égale à 4,375±0,025 MHz.  VCO ADJ C15 R20 C13 R111 C16 C14 C12 R43 1 6 30 1 VR3 R56 CN101 (TP1) C29 Q19 IC 1 R16 C155 R18 VR6 VR5 16 15 Fig. 10-8
11.	**MÉTHODE DE CONTRÔLE DE LA CARACTÉRISTIQUE S (ERREUR DE FOCALISATION)**					
						• Régler le mode d'essai (TEST). (Voir page 53.) • Réaliser un court-circuit entre la broche 6 FCS.IN (entrée de focalisation) de TP1 et la terre GND. • Appuyer sur la touche d'avance de piste (TRACK FWD) (▷▷|) et observer simultanément la forme d'onde à la broche 7 FCS.ERR (erreur de focalisation) de TP1 au moyen d'un oscilloscope.

10. AJUSTES

Los items de ajuste de este modelo deberán ser efectuados en el orden mostrado abajo.

• Items de ajuste

1. Ajuste de compensación de error de sequimiento, foco y RF.
2. Confirmación de la alimentación de salida de LD (diodo laser)
3. Confirmatión de enclavamiento del enfoque y del eje
4. Ajuste del retículo
5. Ajuste del equilibrio de seguimiento
6. Ajuste tangencial
7. Confirmatión del nivel de RF
8. Ajuste de la ganancia de enfoque
9. Ajuste de la ganancia de seguimiento
10. Ajuste de la frecuencia propia de VCO

• Equipo de medición

1. Osciloscopio de doble traza
2. Medidor de alimentación del laser
3. Disco de prueba (YEDS7)
4. Filtro de ajuste de equilibrio de seguimiento
5. Filtro de ajuste de ganancia de bucle
6. Generador de senãal
7. Contador de frecuencia
8. Otras herramientas generales

• Modo de prueba

Todos los ajustes deberán ser ejecutados en el modo de prueba.

Ajuste del modo de prueba y los procedimientos de cancelación

(1) Para disponer el mode de prueba, coloque en ON el interruptor POWER del reproductor (SW101) mientras presiona el interruptor TEST MODE. (terminales del modo de ajuste).

(2) Para cancelar el modo de prueba, simplemente gire el interruptor de POWER del reproductor a OFF.

Las varias funciones de tecla en el modo de prueba están enlistadas en la Tabla 10-1.

• Puntos de ajuste

VR1: Alimentación del laser
VR7: Desviación del seguimiento (TRK.OFS)
VR3: Ganancia de enfoque (FCS.GAN)
VR4: Ganancia de seguimiento (TRK.GAN)
VR5: Equilibrio de seguimiento (TRK.BAL)
VR6: Desviación de enfoque (FCS.OFS)
VR8: Ajuste de VCO
VR2: Compensación de RF (RF.OFS)

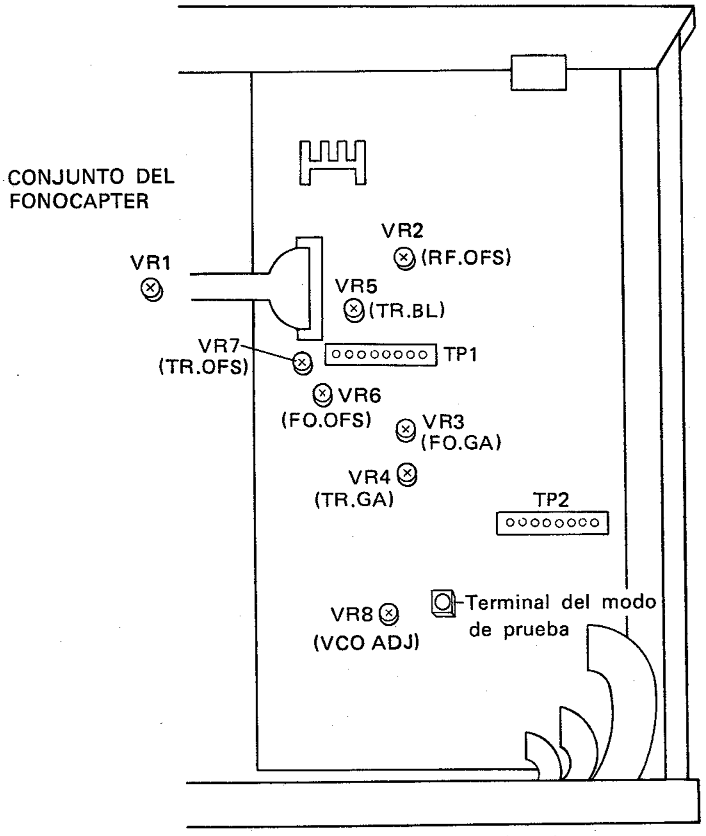
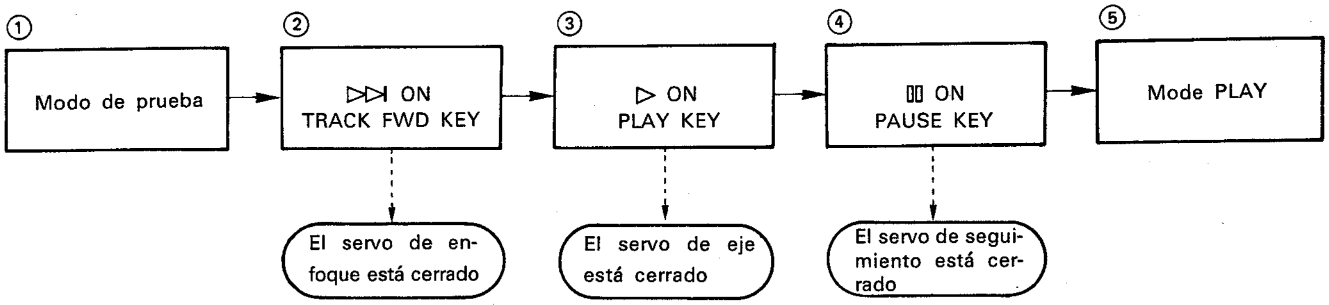


Fig. 10-1 Punto de ajuste

En el modo de prueba, cada servocircuito puede ser cerrado y abierto por operaciones separadas. Consecuentemente, cada servo deberá ser cerrado uno a la vez (en secuencia en serie) para ajustar el modo de PLAY (reproducción).
Fijese que el modo de PLAY no se activa simplemente presionando la tecla de PAUSE (pausa) (▯▯) en el modo de prueba.

Ejemplo: Conmutando del modo de STOP (parado) a PLAY.

* Cada servomecanismo funciona en una secuencia en serie en el modo de prueba.

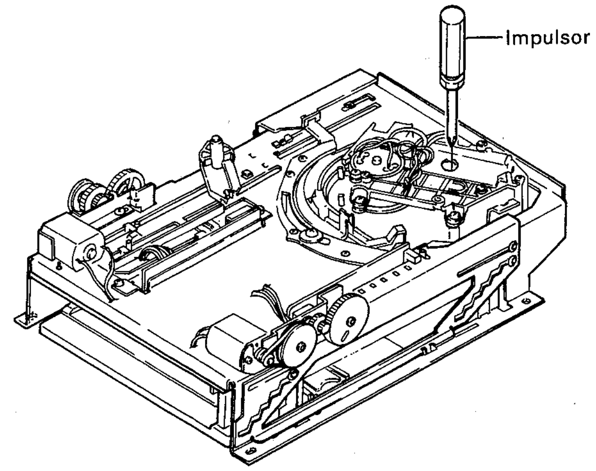
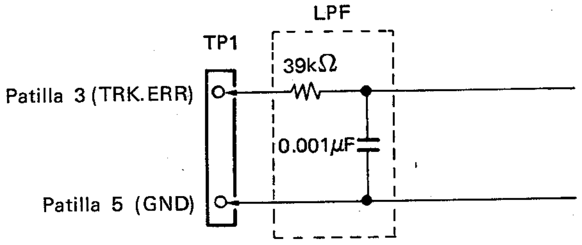

①
Modo de prueba
②
▷▷| ON
TRACK FWD KEY
③
▷ ON
PLAY KEY
④
▯▯ ON
PAUSE KEY
⑤
Mode PLAY
El servo de enfoque está cerrado
El servo de eje está cerrado
El servo de seguimiento está cerrado

• Funciones de tecla en el modo de prueba

Símbolo	Nombre de tecla	Función durante el modo de prueba	Descripció
|◁◁	TRACK BACK	El dido de laser está encendido ON.	El diode laser se enciende.
▷▷|	TRACK FWD	El servo de enfoque está cerrado.	El diodo laser se enciende. El actuador se mueve arriba/abajo, luego se cierra el servo de enfoque.
▷	PLAY	El servo de eje está cerrado.	El eje comienza a rotar y se cierra el servo cuando se convierte en el modo de servo CLV-A.
▯▯	PAUSE	El servo de seguimiento está cerrado/abierto	Ejecuta la operatión de conexión oscilante. Cuando se cierra el servo de seguimiento y se pone en el modo de PLAY presionandoesta tecla (el servo de enfoque y el del eje deberán estar cerrados), y el indicador de pausa se enciende. El servo de seguimiento se abre presionando de nuevo la tecla.
◁◁	MANUAL SEARCH REV	El carro se mueve en la dirección inversa (hacia el centro del disco)	El carro se mueve hacia el centro del disco a una alta velocidad de como 3 cm/seg. Ya que no existe un mecanismo de seguridad para detener el carro, libere la tecla cuando el carro llegue al final.
▷▷	MANUAL SEARCH FWD	El carro se mueve en la dirección hacia delante. (hacia el final del disco)	El carro se mueve hacia el final del disco a una alta velocidad de como 3 cm/seg. Ya que no existe un mecanismo de seguridad para detener el carro, libere la tecla cuando el carro llegue al final.
□	STOP	PARADO	Todos los servos están abiertos.
⏏	OPEN/CLOSE	(bandeja de disco) ABIERTO/CERRADO	La bandeja de disco se abre y se cierra. Sin embardo, el captador no regresa a su posición de aparcamiento. Además, aun cuando se cierra el disco el captador permanece tal como está.

Tabla 10-1

No. de paso	Ajuste del osciloscopio		Puntos de prueba	Puntos de ajuste	Items de verificación/ Especificaciones de ajuste	Procedimiento de ajuste
	V	H				
1	**AJUSTES DE COMPENSATION DE ERROR DE SEGUIMIENTO, FOCO Y RF**					
			PATILLA 2 DE TP1 (TRK.ERR) TP1 VR6 Compens. de foco Esp. 6 (FCS.OFS) 0V ±50mV (FCS.ERR)	VR5 (TRK.BAL) VR7 (TRK.OFS) TP1 VR2 Compens. de RF Esp. 1 (RF.OFS) 100 mV ± 50 mV (RF.OUTPUT)	45° 0V±50 mV	• Ajuste el modo de prueba. (vea la página 64.) • Gire el volumen de TRK.BAL (Equilibrio de seguimiento) de VR5 en el sentido de las mañecillas del reloj 45°del centro. • Ajuste con el volumen de TRK.ERR (Error de seguimiento) de VR7 de modo que el voltaje en TRK.ERR (Error de seguimiento) de la patilla 3 de TP1 se ponga eb 0V±50 mV. • Ajuste VR6 FCS.OFS (compensación de foco) de modo que el voltaje de FCS.ERR (error de foco) en la espiga 6 de TP1 sea 0V ± 50 mV. • Ajuste VR2 RF.OFS (compensación de RF) de modo que el voltaje de salida de RF en la espiga 1 de TP1 sea 100 mV ± 50 mV.
2	**CONFIRMACION DE ALIMENTACION DE ALIDA DE LD (DIODO LASER)**					
				VR1	Especificatión: 0,13 mW±0,01 mW	• Ajuste el modo de prueba. (vea la página 64.) • Presione la tecla de TRACK BACK (⏮) y encienda el LD (Diodo laser). • Ubique el sensor del medidor de potencia del laser inmediatamente arriba del objetivo, y confirme que la potencia de salida del LD sea 0,13 mW±0,01 mW. • Si la potencia estuviera fuera del margen especificado, ajústela con el resistor variable LD OUTPUT POWER ADJ VR1.
3	**CONFIRMACION DE BLOQUEO DE ENFOQUE Y DEL EJE**					
	V 0,5V/div	H 100 mseg/div	Patilla 1 de TP1 (Salida de RF)		Existe salida de RF Rotación normal	• Ajuste del disco de TEST. • Ajuste del mode de TEST. (Vea la página 64.) • Cambie el captador cerca del centro del disco presionando la tecla de MANUAL SEARCH FWD (▷▷). * Tenga en cuenta que este paso deberá ser ejecutado. • Observe RF (Radio frecuencia) de la patilla 1 de TP1 con un osciloscopio y confirme que se saque la senãal de RF después de presionar la tecla de TRACK.ERR (▷▷|). • Presione la tecla de PLAY (▷) y asegúrese que el disco rota en la dirección normal casi a la velocidad especificada (tal como está cerca del centro del disco, la velocidad de rotación es alrededor de 30 rpm) y que no rote anormalmente o inversamente.

No. de paso	Ajuste del osciloscopio		Puntos de prueba	Puntos de ajuste	Items de verificación/ Especificaciones de ajuste	Procedimiento de ajuste
	V	H				
4	**AJUSTE DE LA MIRA**					
	 Fig. 10-2  LPF TP1 39kΩ Patilla 3 (TRK.ERR) 0.001μF Patilla 5 (GND) Fig. 10-3					• Ajuste el mode TEST. (Vea la página 64.) • Cambie el captador cerca del centro del disco presionando la tecla de MANUAL SEARCH FWD (▷▷) de modo que el tornillo de ajuste de retículo del captador pueda ser visto a través del orificio oval en el lado superior del servomecanismo. • Inserte un impulsor de retículo ( ) en el orificio del lado superior del mecanismo como se muestra en la Fig. 10-2, y comfirm que gira el tornillo de retículo. • Presione la tecla de TRACK FWD (▷▷|) y la tecla de PLAY (▷) secuencialmente y cierre el servo de enfoque y el del eje. (No cierre el servo de seguimiento.) • Observe la forma de onda en TRCK.ERR (Error de seguimiento) de la patilla 3 de TP1 con un osciloscopio. Luego inserte un filtro de paso bajo de corte. (Fig. 10-3)
	0,5V/div	5 ms/div	TRK.ERR de la patilla 2 de TP1	Retículo	Punto cero Amplitud máxima	• Gire el impulsor de reticulo y encuentre el punto cero (Foto. 10-1) • Luego, gire lentamente el impulsor de retículo en la dirección de las manecillas del reloj desde el punto cero y ajuste en el punto donde la forma de onda (Senãal de error de seguimiento) primeramente se ponga a una amplitud máxima. (Vea Foto 10-3) Nota: Si el impulsor de retículo se presiona fuertemente, el captador se mueve hacia el centro del disco, por consiguiente el ajuste resulta difícil. • Finalmente, asegúrese de confirmar que la señal de error de seguimiento (en este momento, no se ha insertado el filtro de paso bajo de corte de 4 kHz) cuando el captador se mueve hacia el centro del disco y el voltaje de P-P do la señal de error de seguimiento en la circunferencia exterior del disco no haya variado considerablemente. Cuando se desvía el nivel arriba de ±10%, ajuste de nuevo girando el tornillo de retículo a un punto de amplitud de error mínimo.

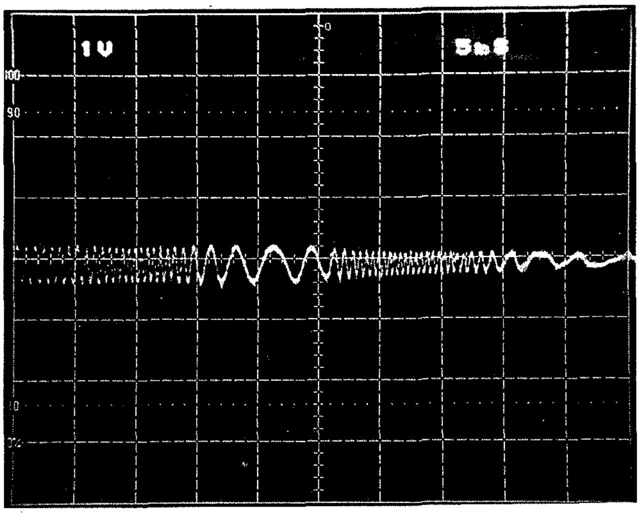


Foto. 10-1. Punto cero

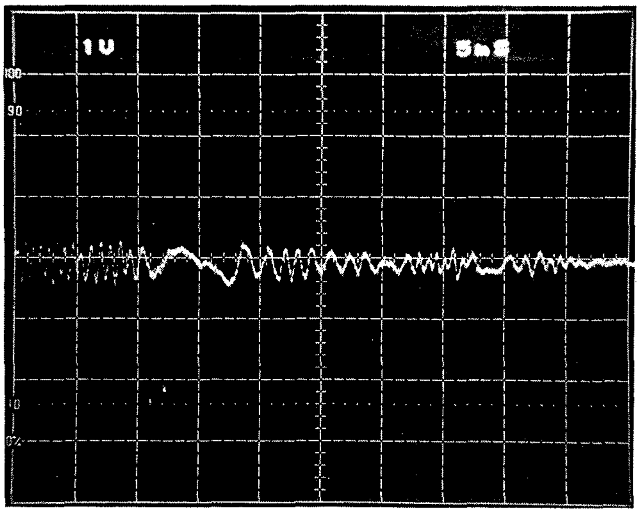


Foto. 10-2. Forma de onda de un punto no cero

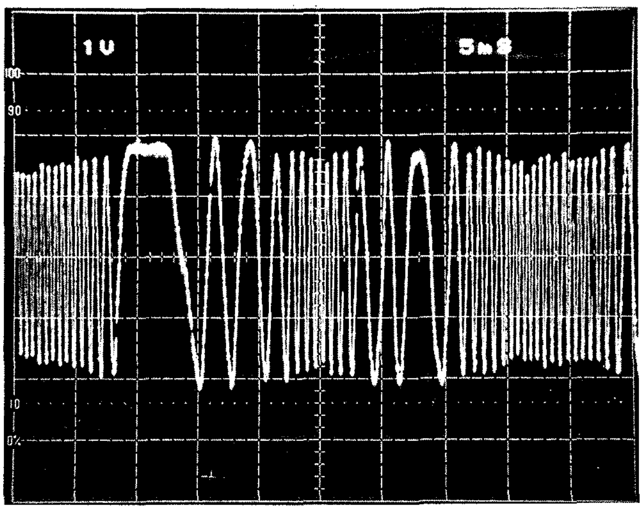


Foto. 10-3 Amplitud máxima

No. de paso	Ajuste del osciloscopio		Puntos de prueba	Puntos de ajuste	Items de verificación/ Especificaciones de ajuste	Procedimiento de ajuste
	V	H				
5	**AJUSTE DE EQUILIBRIO DE SEGUIMIENTO**					
	0,5/div	5 mseg /div	Patilla 2 de TP1 (TRK.ERR)	VR5 (TRK.BAL)	TRK.ERR	• Ajuste el disco de TEST. • Ajuste el mode de TEST. (Vea la página 64.) • Cambie el captador cerca del centro del disco presionando la tecla de MANUAL SEARCH FWD (▷▷). • Presione la tecla de TRACK FWD (▷▷⇥) y la tecla de PLAY (▷) para comenzar a voltear el disco. • Obseve TRK.ERR (Error de sequimiento) de la patilla 2 de TP1 con un osciloscopio y ajuste con el volumen de TRK.BAL (Equilibrio de seguimiento) de VR5 de modo que la componente de CC del error de seguimiento desaparezca. Nota: Cuando se ejecuta este ajuste, asegúrese de siempre ejecutar el ajuste de desviación de error de sequimiento.

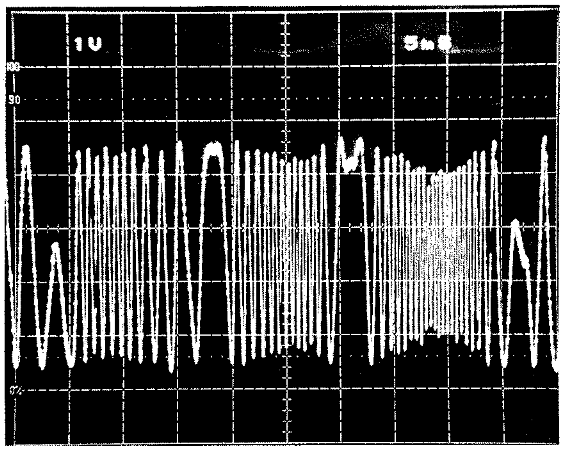


Foto. 10-4 Existe componente de CC

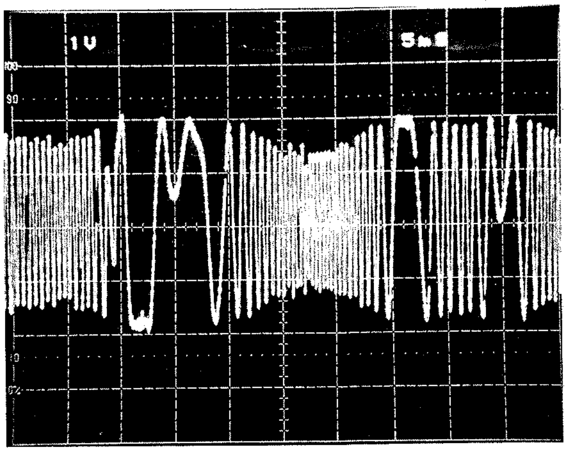
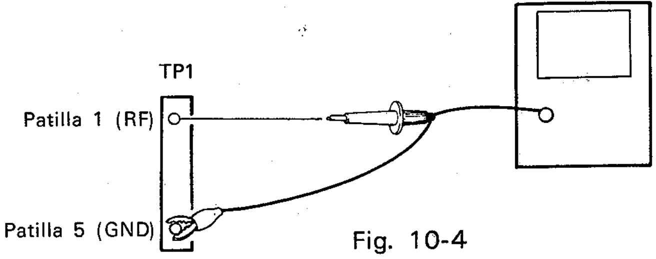


Foto. 10-5 No existe componente de CC

No. de paso	Ajuste del osciloscopio		Puntos de prueba	Puntos de ajuste	Items de verificación/ Especificaciones de ajuste	Procedimiento de ajuste
	V	H				
6	**AJUSTE TANGENCIAL**					
		200 nS	Patilla 1 de TP1 (Salida de RF)	Tornillo de ajuste de la tangencial	Mejor imagen de prueba	• Ajuste el disco de TEST. • Ajuste el mode de TEST. (Vea la página 64.) • Cambie el carro cerca del centro del disco presionando la tecla de MANUAL SEARCH FWD (▷▷). • Presione la tecla de TRAK FWD (▷▷|). la tecla de PLAY (▷) y la tecla de PAUSE (▯▯) secuencialmente, y cierre todos los servos. (El indicador de pausa se enciende.) • Observe el RF de la patilla 1 (Salida de RF) de TP1 con un osciloscopio y ajuste con el tornillo de la tangencial de modo que la imagen de prueba resulte nítida. (Fig. 10-4) • El punto de ajuste es el punto medio entre el punto donde la imagen de prueba se deteriora girando el tornillo de la tangencial en el sentido de las manecillas del reloj, y el punto donde la imagen de prueba se deteriora girando el tornillo de la tangencial en contra del sentido de las manecillas del reloj. Como un criterio, observe que la forma de onda en conjunto sea nítida y que una de las figuras de diamante esté dentro de la imagen de prueba (Foto. 10-6), y ajuste al punto óptimo donde la forma de diamante se vea relativamente como una línea fina.  Fig. 10-4 (Nota) Durante el ajuste, sostenga la llave hexagonal hacia arriba para mantener el cuerpo del captador de no ir hacia abajo.

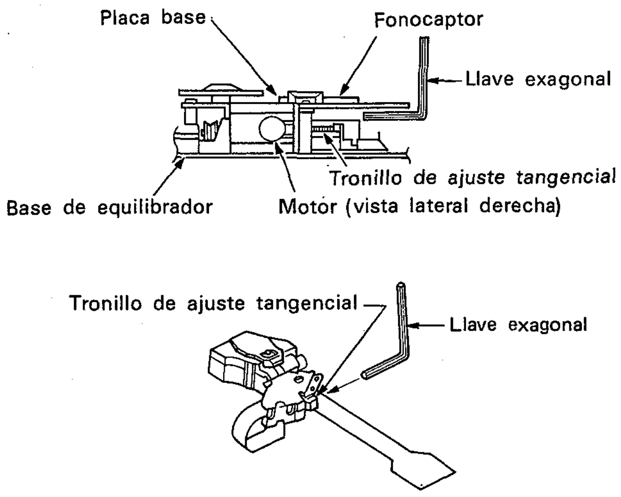

Placa base
Fonocaptor
Llave exagonal
Tronillo de ajuste tangencial
Base de equilibrador
Motor (vista lateral derecha)
Tronillo de ajuste tangencial
Llave exagonal

Fig. 10-5 Ajuste tangencial

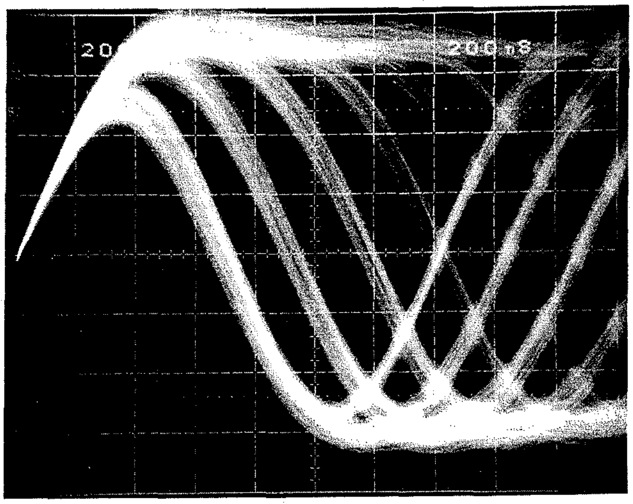


Foto. 10-7

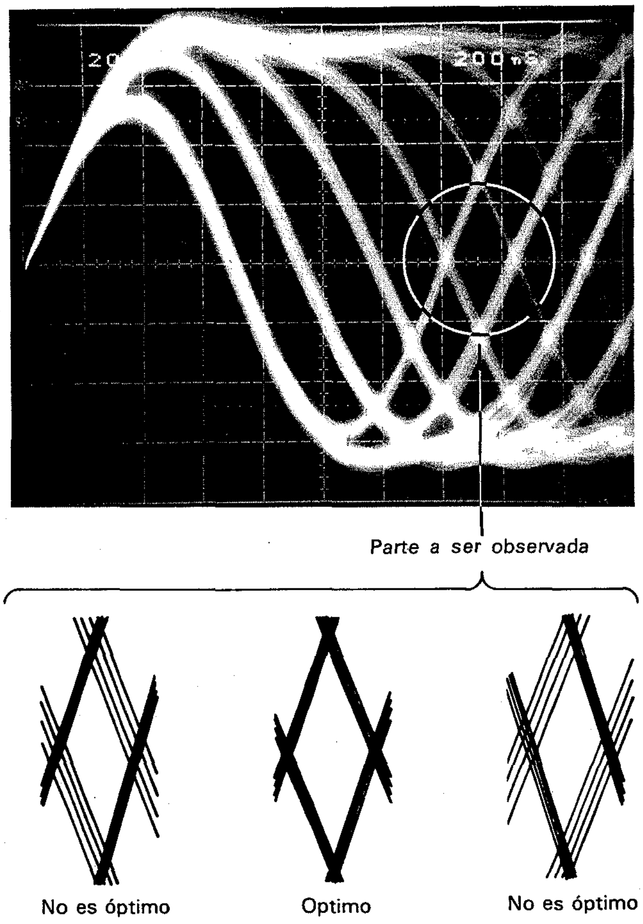


Foto. 10-6

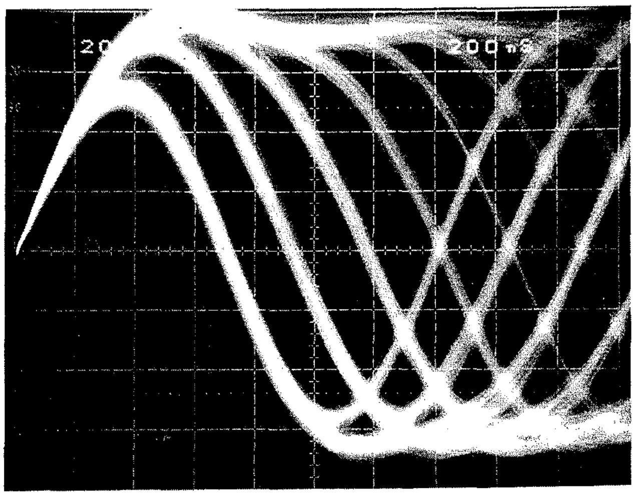


Foto. 10-8

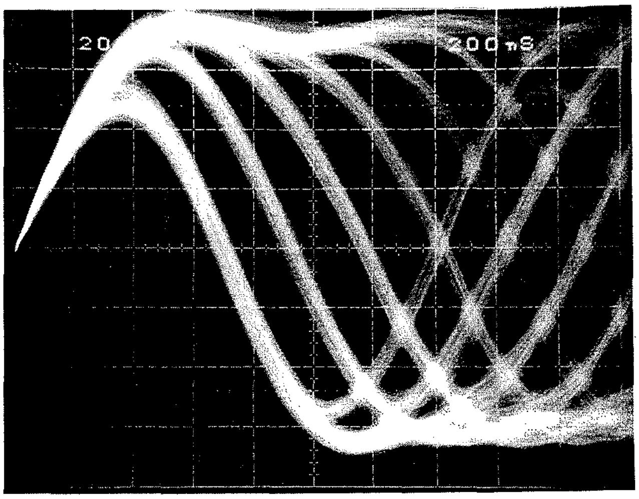
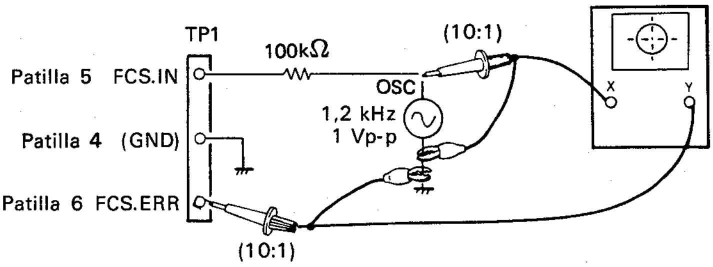


Foto. 10-9

No. de paso	Ajuste del osciloscopio		Puntos de prueba	Puntos de ajuste	Items de verificación/ Especificaciones de ajuste	Procedimiento de ajuste
	V	H				
7	**CONFIRMACION DEL NIVEL DE RF**					
			Patilla 1 de TP1 (RF)	Alimentación del laser VR1	2.0 Vp-p ±0.6 Vp-p	• Ajuste el mode de TEST. (Vea la página 64.) • Reproduzca el disco de TEST y conecte la sonda de un osciloscopio a la RF de la patilla 1 (Salida de RF) de TP1 y mida el voltaje de P-P de la forma de onda de RF. • Confirme que el valor sea 2,0V±0,6 Vp-p. • En caso de que esté por encima de 2,6 Vp-p, ajústelo al margen especificado.
8	**AJUSTE DE GANANCIA DE ENFOQUE**					
	20 mV/div.5/mV/div. CH1 (X), CH2 (Y) (SONDA 10:1)		Eje X Patilla 5 de TP1 (FCS.IN) Eje Y Patilla 6 de TP1 (FCS.ERR)	VR3 (GANACIA FCS)	Diferencia de fase 90°	• En el estado de POWER OFF (apagado), conecte el osciloscopio y el oscilador como se muestra en la Fig. 10-6. • Ajuste el mode de TEST. (Vea la página 64.) • Presione la tecla de TRACK FWD (▷▷I), la tecla de PLAY (▷) y la tecla de PAUSE (II) secuencialmente, y encienda el servo de enfoque, el del eje y el de seguimiento. • Encienda el oscilador y extraiga 1,2 kHz 1 Vp-p. Nota: (Dependiendo en los osciladores, algunos de ellos producen CC cuando son encendidos. Por lo tanto, es conveniente conectar el oscilador después del encendido.) • Ajuste con el volumen de FCS.GAN (Ganancia de enfoque) de VR3 de modo que la figura de Lissajous del oscilloscopio a ser un círculo horizontal (90° de diferencia de fase).  TP1 100kΩ (10:1) Patilla 5 FCS.IN OSC 1,2 kHz 1 Vp-p Patilla 4 (GND) Patilla 6 FCS.ERR (10:1) X Y Fig. 10-6

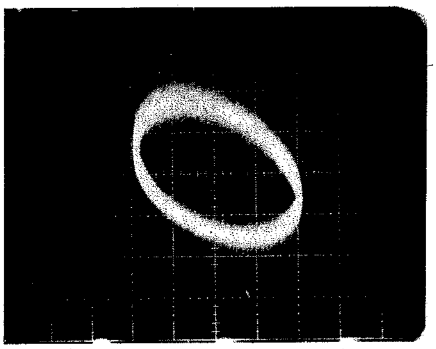


Foto. 10-10 Alta ganacia

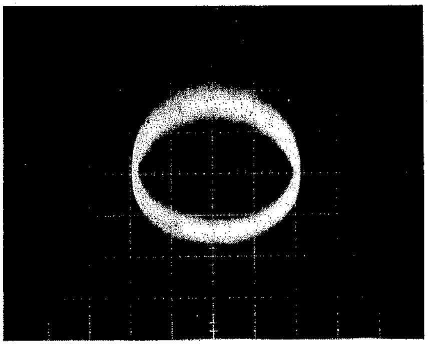


Foto. 10-11 Ganacia óptima

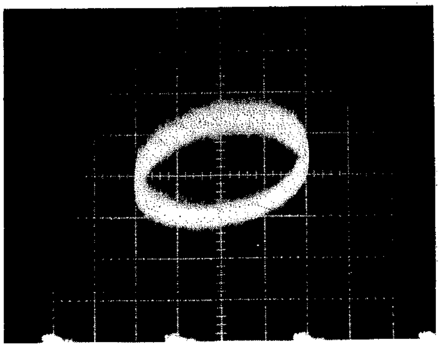
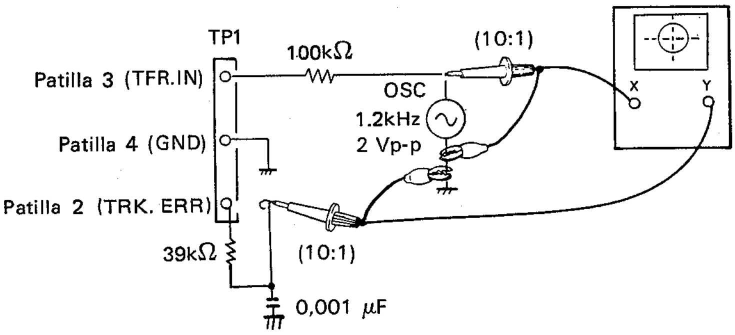


Foto. 10-12 Baja ganancia

No. de paso	Ajuste del osciloscopio V	Ajuste del osciloscopio H	Puntos de prueba	Puntos de ajuste	Items de verificación/ Especificaciones de ajuste	Procedimiento de ajuste
9	**AJUSTE DE GANANCIA DE SEGUIMIENTO**					
	50 mV/div. 5 mV/div. CN1 (X), CH2 (Y) (SONDA 10:1)		Eje X Patilla 3 de TP1 (TRK.ERR) Eje Y Patilla 2 de TP1 (TRK.ERR)	VR4 (TRK.GAN)	90° de diferencia	• En el estado de POWER OFF (apagado), conecte un osciloscopio y un oscilador como se muestra en la Fig. 10-7. • Ajuste el mode de TEST. (Vea la página 64.) • Presione la tecla de TRACK FWD (▷▷I), la tecla de PLAY (▷), y la tecla de PAUSE (II) secuencialmente, y encienda el servo del enfoque, el del eje y el de seguimiento. • Encienda el oscilador y extraiga 1,2 kHz 1 Vp-p. Nota: (Dependiendo en los osciladores, algunos de ellos producen CC cuando son encendidos. Por la tanto, es conveniente conectar el oscilador después del encendido.) • Ajuste con el volumen de TRAK GAN de VR4 (Ganancia de seguimiento) de modo que la figura de Lissajous del osciloscopio llege a ser un círculo horizontal (90° de diferencia de fase).  TP1 Patilla 3 (TFR.IN) Patilla 4 (GND) Patilla 2 (TRK. ERR) 100kΩ (10:1) OSC 1.2kHz 2 Vp-p 39kΩ (10:1) 0,001 μF X Y Fig. 10-7

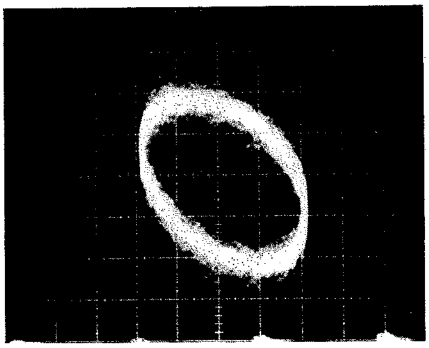


Foto. 10-13 Alta ganacia

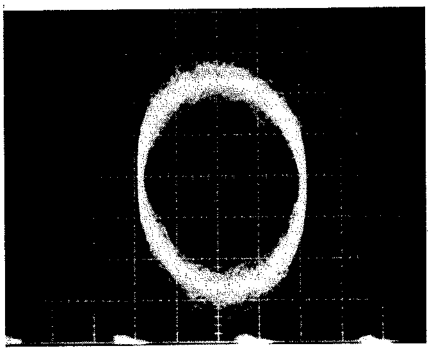


Foto. 10-14 Ganancia óptima

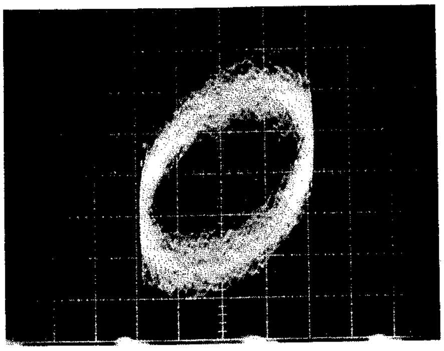
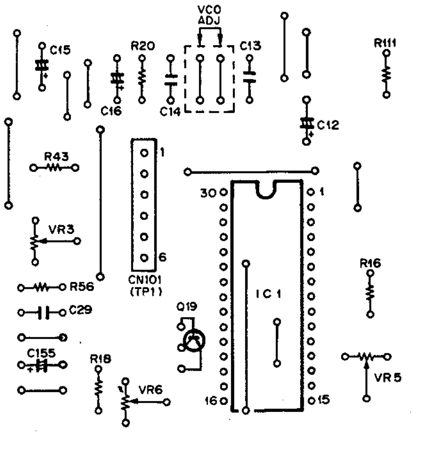


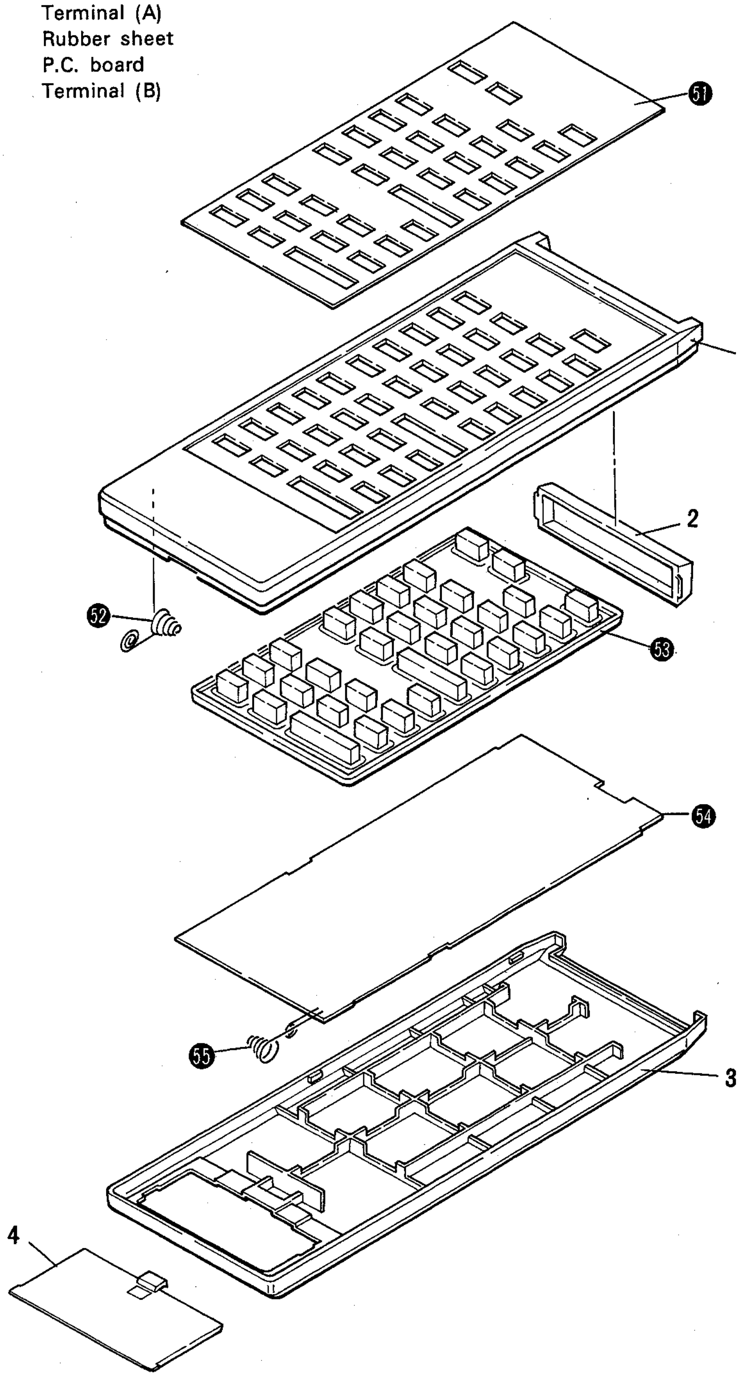
Foto. 10-15 Baja ganancia

No. de paso	Ajuste del osciloscopio		Puntos de prueba	Puntos de ajuste	Items de verificación/ Especificaciones de ajuste	Procedimiento de ajuste
	V	H				
10	**AJUSTE DE LA FRECUENCIA PROPIA DE VCO**					
			Patilla 2 de TP2	VR8 (VCO.ADJ)	4,375±0,025 MHz	• Ajuste el mode de TEST. (Vea la página 64.) • Haga un cortocircuito entre ASY y la conexión volante de GND con impulsor de retículo, etc. (Fig. 10-8) • Conecte el frecuencímetro, que pueda medir arriba de 10 MHz, a la patilla 2 de TP2. • Ajuste con el volumen VCO ADJ (ajuste de VCO) de VR8 de modo que el valor del frecuencímetro se ponga en 4,375±0,025 MHz.  VCO ADJ C15 R20 C13 R111 C16 C14 C12 R43 1 30 VR3 6 CN101 (TP1) R16 R56 C29 Q19 IC1 C155 R18 VR6 16 15 VR5 Fig. 10-8
11	**METODO PARA CONFIRMAR EL CARACTER S (ERROR DE ENFOQUE)**					
						• Ajuste el mode de TEST. (Vea la página 64.) • Haga un cortocircuito entre FCS.IN (Entrada de enfoque) de la patilla 6 de TP1 y GND. • Presione la tecla de TRACK FWD (⊳⊳I) y observe la forma de onda de FCS.ERR (Error de enfoque) de la patilla 7 de TP1 con un osciloscopio.

11. REMOTE CONTROL UNIT (PWW1008)

Parts List of Remote Control Unit

Mark	No.	Part No.	Description
	1	PNW1151	Case (A)
	2	PAM1071	Filter
	3	PNW1152	Case (B)
	4	PNW1153	Cover
	51		Aluminum plate
	52		Terminal (A)
	53		Rubber sheet
	54		P.C. board
	55		Terminal (B)



12. FOR KC, HEM, HB, SD, AND SD/G TYPES

NOTES:
- *Parts without part number cannot be supplied.*
- *Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★ GENERALLY MOVES FASTER THAN ★
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

CONTRAST OF MISCELLANEOUS PARTS

The PD-M50/KC, HEM, HB, SD and SD/G types are the same as the PD-M50/KU type with the exception of the following sections.

Mark	Symbol & Description	Part No.						Remarks
		KU	KC	HEM	HB	SD	SD/G	
⚠ ⊙	Main board assembly	PWZ1159	PWZ1159	PWZ1223	PWZ1223	PWZ1229	PWZ1229	
⊙	Control board assembly*	PWZ1160	PWZ1160	PWZ1224	PWZ1224	PWZ1230	PWZ1230	
	Transformer board assembly							
⚠	AC power cord	PDG1002	PDG1002	PDG1003	PDG1004	PDG1013	PDG1013	
⚠	Strain relief	CM-22C	CM-22C	CM-22B	CM-22B	CM-22B	CM-22B	
⚠ ★★	S1 Voltage selector	.....	.....	.....	.....	PSB1002	PSB1002	
	(AC110/120-127/220/240V)							
	Packing case	PHG1080	PHG1091	PHG1091	PHG1091	PHG1091	PHG1091	
	Single magazine assembly	PXA1043	PXA1043	.....	.....	PXA1043	PXA1043	
	Operating instructions							
	(English)	PRB1022	.....	.....	PRB1022	PRB1022	PRB1022	
	(English/French)	.....	PRE1021	PRE1021	.....	.....	.....	
	(German/Italian)	.....	.....	PRF1002	.....	.....	.....	
	(Spanish)	.....	.....	.....	.....	PRC1005	.....	

* Marked P.C. board assemblies:
Regard less differences on parts numbers, the P.C. board assemblies for the additional types are identical with the KU type.

MAIN BOARD ASSEMBLY (PWZ1223)

The main board assembly (PWZ1223) is the same as the main board assembly (PWZ1159) with the exception of the following sections.

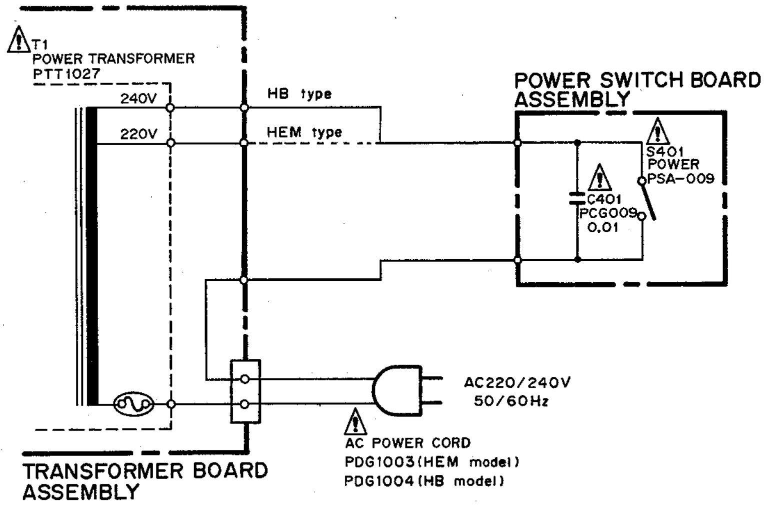
Mark	Symbol & Description		Part No.		Remarks
			PWZ1159	PWZ1223	
	C5, C20	(330/16)	CEAS331M16	.....	
		(220/25)	.....	PCH1056	
	C12, C15	(33/35)	CEAS330M35	.....	
		(220/50)	.....	PCH1045	
	C69, C70		CQMA104K50	CFTXA104J50	
	C100	(2200/25)	CEAS222M25	.....	
		(220/50)	.....	PCH1043	
	C102	(1000/16)	CEAS102M16	.....	
		(220/50)	.....	PCH1004	
	C150—C153		CQMA104K50	CFTXA104J50	
★★	IC11		NJM78M05FA	NJM7805FA	
★★	IC12		NJM79M05FA	NJM7905FA	

TRANSFORMER BOARD ASSEMBLY

The transformer board assembly (for KC, HEM, HB, SD and SD/G types) are the same as the transformer board assembly (for KU type) with the exception of the following sections:

Mark	Symbol & Description	Part No.						Remarks
		KU	KC	HEM	HB	SD	SD/G	
⚠ ★	T1 Power transformer (AC120V) (AC220/240V) (AC110/120-127/220/240V)	PTT1026	PTT1026	..... PTT1027	..... PTT1027	.... PTT1028	.... PTT1028	

Schematic Diagram of HEM and HB types


T1
POWER TRANSFORMER
PTT1027
240V
220V
HB type
HEM type
POWER SWITCH BOARD ASSEMBLY
S401
POWER
PSA-009
C401
PCG009
0.01
AC220/240V
50/60Hz
AC POWER CORD
PDG1003(HEM model)
PDG1004(HB model)
TRANSFORMER BOARD ASSEMBLY

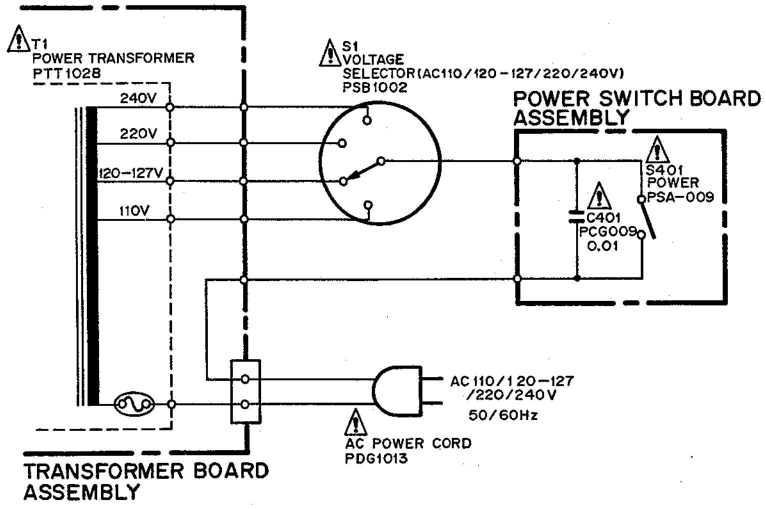
Line Voltage Selection
(For HEM and HB types)

Line voltage can be changed with following steps.

1. Disconnect the AC Power cord.
2. Remove the Bonnet case.
3. Change the connection of the primary lead wires. (Connect as shown in Fig.)
4. Stick the line voltage label on the rear panel.

Description	Part No.
220V label	AAX-193
240V label	AAX-192

Schematic Diagram of SD type


T1
POWER TRANSFORMER
PTT1028
240V
220V
120-127V
110V
S1
VOLTAGE
SELECTOR(AC110/120-127/220/240V)
PSB1002
POWER SWITCH BOARD ASSEMBLY
S401
POWER
PSA-009
C401
PCG009
0.01
AC110/120-127
/220/240V
50/60Hz
AC POWER CORD
PDG1013
TRANSFORMER BOARD ASSEMBLY

13. FOR PD-M40/KU, KC, HEM, HP, SD AND PD-M40-S/HEM TYPES.

NOTES:

- *Parts without part number cannot be supplied.*
- *Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★ GENERALLY MOVES FASTER THAN ★
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
- *When ordering resistors, first convert resistance values into code form as shown in the following examples.*
  Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).
  560Ω 56×10^1 561.......................... RD1/4PS $\boxed{5}\boxed{6}\boxed{1}$ J
  47kΩ 47×10^3 473.......................... RD1/4PS $\boxed{4}\boxed{7}\boxed{3}$ J
  0.5Ω 0R5.. RN2H $\boxed{0}\boxed{R}\boxed{5}$ K
  1Ω 010.. RS1P $\boxed{0}\boxed{1}\boxed{0}$ K

  Ex. 2 When there are 3 effective digits (such as in high precision metal film resistors).
  5.62kΩ 562×10^1 5621...................... RN1/4SR $\boxed{5}\boxed{6}\boxed{2}\boxed{1}$ F

CONTRAST OF MISCELLANEOUS PARTS

The PD-M40/KU, KC, HEM, HP, SD and PD-M40-S/HEM types are the same as the PD-M50/KU type with the exception of the following sections.

Mark	Symbol & Description	Part No.						
		PD-M50	PD-M40					PD-M40-S
		KU	KU	KC	HEM	HP	SD	HEM
⊙	Main board assembly	PWZ1159	PWZ1073	PWZ1073	PWZ1073	PWZ1073	PWZ1235	PWZ1073
⊙	Control board assembly	PWZ1160	PWZ1074	PWZ1074	PWZ1074	PWZ1074	PWZ1236	PWZ1074
⚠	AC power cord	PDG1002	PDG1002	PDG1002	PDG1008	PDG1011	RDG1003	PDG1008
⚠	Strain relief	CM-22C	CM-22C	CM-22C	CM-22B	CM-22B	CM-22B	CM-22B
⚠	Transformer board assembly	Non supply	Non supply	Non supply	Non supply	Non supply	Non supply	Non supply
⚠ ★★	S1 Voltage selector (AC110/120-127/220/240V)	.....	.....	.....	.....	.....	PSB1002	.....
	Cord with mini-plug	.....	PDE-319	PDE-319	PDE-319	PDE-319	PDE-319	PDE-319
	Packing case	PHG1080	PHG1079	PHG1089	PHG1089	PHG1089	PHG1089	PHG1090
	Headphone assembly	Non supply	.....	.....	.....	.....	.....	.....
	Operating instructions							
	(English)	PRB1022	PRB1021	.....	.....	PRB1021	PRB1021	.....
	(English/French)	.....	.....	PRE1020	PRE1020	.....	.....	PRE1020
	(German/Italian)	.....	.....	.....	PRF1001	.....	.....	PRF1001
	(Spanish)	.....	.....	.....	.....	.....	PRC1005	.....
	Remote control unit	PWW1008	.....	.....	.....	.....	.....	.....
	Single magazine assembly	PXA1043	.....	.....	.....	.....	.....	.....
	Door assembly	PYY1031	PYY1030	PYY1030	PYY1030	PYY1030	PYY1030	PYY1030
	Headphone knob	PAC-266	.....	.....	.....	.....	.....	.....
	Function button	PAC1095	PAC1053	PAC1053	PAC1053	PAC1053	PAC1053	PAC1064
	Operation button	PAC1112	PAC1099	PAC1099	PAC1099	PAC1099	PAC1099	PAC1121
	Door name plate	PAM1103	PAM1104	PAM1104	PAM1104	PAM1104	PAM1104	PAM1104
	FL filter	PAM1067	PAM1066	PAM1066	PAM1067	PAM1066	PAM1066	PAM1067
	Phono name plate	PAM1068	PAM1064	PAM1064	PAM1064	PAM1064	PAM1064	PAM1076
	Display window	PAM1069	PAM1062	PAM1062	PAM1062	PAM1062	PAM1062	PAM1062
	Panel name plate	PAM1074	PAM1065	PAM1065	PAM1065	PAM1065	PAM1065	PAM1065
	Control panel	PNW1147	PNW1146	PNW1146	PNW1146	PNW1146	PNW1146	PNW1157
	Power button	PAC1097	PAC1097	PAC1097	PAC1097	PAC1097	PAC1097	PAC1119
	Eject button	PAC1098	PAC1098	PAC1098	PAC1098	PAC1098	PAC1098	PAC1120
	TRP button	PAC1100	PAC1100	PAC1100	PAC1100	PAC1100	PAC1100	PAC1122
	DISC button	PAC1101	PAC1101	PAC1101	PAC1101	PAC1101	PAC1101	PAC1123
	Bonnet	PNA1107	PNA1107	PNA1107	PNA1107	PNA1107	PNA1107	PNA1108

MAIN BOARD ASSEMBLY (PWZ 1073 and PWZ 1235)

The main board assemblies (PWZ1073) and (PWZ1235) are the same as the main board assembly (PWZ1159) with the exception of the following sections.

Mark	Symbol & Description	Part No.			Remarks
		PWZ1159	PWZ1073	PWZ1235	
★★	IC3	CXD1135QZ	CXD1130QZ	CXD1130QZ	
★★	IC5	PCM56P-J	PCM56P	PCM56P	
★★	IC13	NJM78L12A	.....	.....	
★★	IC14	NJM79L12A	.....	.....	
★★	IC20	NJM78L05A	.....	.....	
★★	IC21	NJM79L05A	.....	.....	
★★	IC25, IC26	M5238PF	μPC4572C	μPC4572C	
★	D5—D8	S5688B	.....	.....	
★	D17—D19	.....	1SS254	1SS254	
	DL1, DL2	PTF1009	.....	.....	
	L2, L3	LAU010K	.....	.....	
	L4, L6	.....	LAU101K	LAU101K	
	C65, C66	CQSA331J50	CQSA271J50	CQSA271J50	
	C104, C105	CEAS102M25	.....	.....	
	C67, C68	CFTX683J50	CQMA683J50	CQMA683J50	
	C91	.....	CKCYF103Z50	CKCYF103Z50	
	C106, C107	CEAS471M25	.....	.....	
	C111, C112	CEAS471M16	.....	.....	
	C144, C147	CFTXA103J50	CQMA103K50	CQMA103K50	
	R3, R5, R97, R98, R104, R110, R131, R132	RD1/6M□□□J	.....	.....	
	R4, R6	RD1/6PM562J	RD1/6PM123J	RD1/6PM123J	
	R76	RD1/6PM302J	RD1/6PM332J	RD1/6PM123J	
	R77, R78	RD1/6PM302J	RD1/6PM392J	RD1/6PM392J	
	R100, R106	RD1/6PM123J	RD1/6PM163J	RD1/6PM163J	
	R103, R109	RD1/6PM511J	RD1/6PM102J	RD1/6PM102J	
	R117	RD1/6PM224J	RD1/6PM274J	RD1/6PM274J	
	JA1 2P pin-jack	VKB-006	PKB1003	PKB1003	
	JA2, JA3 3.5φ mini-jack	.....	RKN-071	RKN-071	

CONTROL BOARD ASSEMBLY (PWZ 1074 and PWZ 1236)

The control board assemblies (PWZ1074) and (PWZ1236) are the same as the control board assembly (PWZ1160) with the exception of the following section.

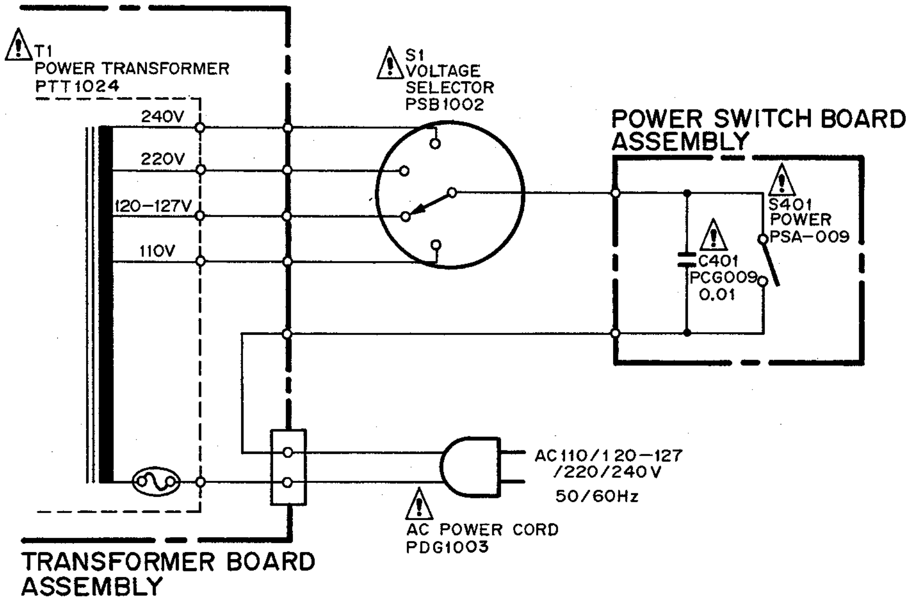
Mark	Symbol & Description	Part No.			Remarks
		PWZ1160	PWZ1074	PWZ1236	
	Remoto control receiver	BX-1387	.....	.....	
	L201, L202	LAN010K	.....	.....	

TRANSFORMER BOARD ASSEMBLY

The Transformer board assembly (for PD-M40/KU, KC, HEM, HP, SD and PD-M40-S/HEM types) are the same as the Transformer board assembly (for PD-M50/KU type) with the exception of the following sections.

Mark	Symbol & Description	Part No.						
		PD-M50 /KU	PD-M40 /KU	PD-M40 /KC	PD-M40 /HEM	PD-M40 /HP	PD-M40 /SD	PD-M40 -S/HEM
⚠ ★	T1 Power transformer (AC120V)	PTT1026	PTT1022	PTT1022	.....	.....	.....	.....
	(AC220/240V)	.....	.....	.....	PTT1023	PTT1023	.....	PTT1023
	(AC110/120-127/220/240V)	.....	.....	.....	.....	.....	PTT1024	.....
	C308—C310	CKCYF103Z50	.....	.....	.....	.....	.....	.....

Schematic Diagram of SD type


T1
POWER TRANSFORMER
PTT1024
240V
220V
120–127V
110V
S1
VOLTAGE
SELECTOR
PSB1002
POWER SWITCH BOARD
ASSEMBLY
S401
POWER
PSA–009
C401
PCG009
0.01
AC110/120–127
/220/240V
50/60Hz
AC POWER CORD
PDG1003
TRANSFORMER BOARD
ASSEMBLY